The Electrical Review

VOL. CXIV. FEBRUARY 16, 1934. No. 2934.

THE OLDEST ELECTRICAL PAPER. ESTABLISHED 1872.

Published every FRIDAY, Price 6d.

THE ELECTRICAL REVIEW, DORSET HOUSE, STAMFORD STREET, LONDON, S.E.1.

Telegraphic Address: "AGEEKAY, WATLOO, LONDON." Code, A B C. Telephone No.: Hop 3333 (50 lines).

The "Electrical Review" is the recognised medium of the Electrical Trades and has by far the largest Circulation of any Electrical Industrial Paper in Great Britain.

SUBSCRIPTION RATES, Postage Free: United Kingdom, £1 14s. 8d. Canada, £1 12s. 6d. Colonial and Foreign, £2 1s. 6d. per annum. Cheques and Postal Orders (on Chief Office, London) to be made payable to ELECTRICAL REVIEW, LTD., and crossed "Lloyds Bank."

For List of Foreign Agents for the ELECTRICAL REVIEW see Advertisement Supplement.

Principal Contents:

	PAGE
Research and the Engineer	217
The British Industries Fair	219
The I.E.E. Dinner and Electrical Engineers' Ball	240
Meetings and Discussions	241
End-cell Regulation	243
Correspondence: Admission to the Fair; A Fatality at Armagh; Engineers and Economics; Electrical Engineers—and Others; British Inventors; Two-part Tariff Metering; Suggestions for a Two-part Tariff	244
Electrically Operated Coke-screening Plant	245
Business and Industrial Notes	246
Electricity Supply	250
Traction	252
Communications	252
Contract Information	253
Notes	254
Our Personal Column	255
New Companies Registered	256
Returns of Electrical Companies	256
City Notes	257
Stocks and Shares	257
Published Specifications	259
New Work for Contractors	260

Research and the Engineer

AT the annual dinner of the Institution of Electrical Engineers, Lord Rutherford, referring to the debt that industry owed to science, spoke with feeling of the need to retain laboratories and to foster research within our own country whatever international arrangements might be made in the financial sphere. Our readers will probably agree with this view, not only because British research engineers are more closely in touch with the needs of our people but also because research provides scope for some of our best brains.

Lord Rutherford's words were in the right vein as a response to the speech of the Minister of Transport, who had urged engineers to go forward undiscouraged by the present failure of others to make proper use of the gifts of science, since progress will more and more depend upon what Mr. C. C. Paterson has called "the scientific spirit of inquiry."

The following day, at the luncheon of the Electrical Research Association, Sir Hugo Hirst gave to these principles a more practical twist, and his remarks were corroborated by the I.E.E. President, Mr. P. V. Hunter, from a slightly different angle. The results of organised research may not, in many cases, be noticed at once, but estimates that appear quite reasonable have been made from time to time of savings to industry that are directly attributable to the work of our co-operative research association, the E.R.A., or to the laboratories which are maintained by electrical manufacturers.

A mere mention of a few of the items the development of which is largely due to research work should be enough to make out a *prima facie* case for its support: cable dielectrics, concrete poles, heating of grouped distributors, discharge lamps, creep of metals, circuit-breaker capacities, radio, earthing, hot-plates, and investigations into the effect of transients upon transmission equipment.

Although it may be difficult to show immediate cash results from research, we believe the commercial men in our industry are ready to take long views if the engineers will put the case forcibly enough. There is perhaps a psychological difficulty here. Our country's prosperity has owed so much in the past to the empiricism of the British engineer—the type of genius which is manifested as an ability to make the utmost use of experience for easily foreseeable ends—that there is a temptation to rely upon it wholly in the different conditions that have evolved. Nevertheless, upon the engineer rests the responsibility of voicing the claims of research to those who find the money wherewith it may be pursued.

But it is not only conditions in this country that we have to consider. Research and discovery, as Sir Hugo emphasised, are essential to the maintenance of our export trade. Our reputation for sound design and reliable workmanship has given us a strong position abroad, but unless we hold a real faith in the value of the organised acquisition of knowledge, and implement our faith by works in making financial provision for it, we shall have difficulty in retaining our present status as a first-class engineering power which has been so hardly won.

Yorkshire Power Progress

VERY satisfactory is the position of affairs revealed in the annual report of the Yorkshire Electric Power Company. Improvement in the textile and other manufacturing trades and among power-users generally has brought increased demand for supply, with a resultant advance of nearly twenty-one million units sold to consumers, making the year's figure nearly 236 million units, in addition to about 144 million units supplied to the Central Electricity Board. The net profit advanced from £372,774 in 1932 to £439,665 for last year. The dividends are the same as for several years past, but £150,000 has been put to depreciation and reserve and £35,000 to plant renewals fund. A new and very satisfactory item in the accounts is the setting aside of £30,000 as the first instalment for the establishment of an employés' pension fund. A contributory scheme which has been prepared will

cover the future services of employés, but such sums as that now set aside are intended to meet the circumstances of employés who were in the company's service prior to the establishment of that scheme.

Gas Explosions

AT several gas company meetings last week Dr. C. Carpenter indulged in a little badinage at the expense of electricity—which, he said, gasmen (for some undiscovered reason) called "Pretty Fanny." It is but a short time ago that the gas people were hankering after a wedding between their "Oswald" and "Pretty Fanny," but, the lady having flatly declined, the irate parents of "Oswald" are fuming—it is their nature to. Their annoyance is understandable. Both of the companies referred to suffered a diminution of sales last year, while electricity again went ahead by leaps and bounds. Dr. Carpenter, who was obviously under the influence of this rapid progress, gave reasons for the gas decline, which no doubt convinced his shareholders; not one asked why the sales of electricity continued to grow. It is clear that people are coming to prefer electricity in spite of all those disadvantages so painfully enumerated by Dr. Carpenter, for when it comes to disadvantages electricity is not in the same street as gas—but we must not talk of streets, as that is another sore point.

Cooker Efficiency

WHEN our gas friends talk about cookers and cooking they tactfully ignore the question of efficiency as being too academical for the consumer. They merely point out that gas at so much a therm is equal to electricity at a hundredth of a penny per unit —or something equally absurd. At the meeting of the South Metropolitan Gas Co., however, Dr. Carpenter admitted that "large numbers of cookers would be better for replacement by more modern types, and we are now engaged in a consideration of this problem." We would suggest that when gas consumers decide that the time has come for a more modern type of cooker they should get the most modern—and efficient —the electric type.

Justifiable Anxiety

TRY as they may to treat the position in lighter vein or with levity, the gas spokesmen and publicists utterly fail to conceal their anxiety at the rapid progress that electricity is making in the domestic field. Last week's speeches were a full acknowledgment that it must be seriously reckoned with, however much they belittled the rate of our advance and the reasons for it, or exaggerated our fires and failures. Their statements could easily be torn to shreds if electrical men needed it. Seeing that the speeches were delivered at shareholders' meetings and published as advertisements in the Press, perhaps the most appropriate place for reply to some of the humorous misstatements would be the annual meetings which will shortly be held by electricity supply companies, the reports to receive publicity in the newspapers. For circulation amongst such members of the general public as may be supposed to read advertised reports of gas meetings, E.D.A. also might prepare a point-by-point reply. The Association would thus render a useful service which would simultaneously counteract any possible effect of poisonous literature of which gas publicists seem to be making a speciality in these days which they are finding so trying.

Temperature and Domestic Supplies

A MEASURE of the effect of weather on output is supplied by the experience of the Gas Light and Coke Co. that the decrease in its sales of gas by one per cent. (net) last year was accounted for by the average temperature in 1933 being one degree higher than in 1932. The output of electricity in Great Britain increased last year by over 10 per cent., and the rate has been more than maintained in January, after allowing for an additional working day. Sir David Milne Watson says that the increases of which electricity boasts are due to its serving purposes for which gas is not suitable. But a substantial proportion of the advance in electricity is due to greater sales for domestic purposes. Our own modest claim is not that gas is unsuitable for this class of consumer. It is merely that electricity is far superior.

The Illimitable

FOR about 180 years, ever since Black's classic experiments, latent heat has been regarded generally as something which wastes good B.th.u., in that it requires about six times as many of them to convert water into steam at atmospheric pressure as would bring the water to boiling point. "Power without Fuel" is the title of a little book which tells us that we could use latent heat to provide unlimited energy and so raise revenue without taxation. The author's social conscience does not permit his divulging technical details at the moment, in view of the reactions that he fears his scheme would have on the Stock Exchange and on employment. He regards it necessary first of all to set up an International Board of Control to ensure that the gift of power is not abused, and works out the organisation of this Board with an elaboration that recalls one of Æsop's fables. The scheme has evidently something to do with waterfalls (but this does not prevent its being applied to marine propulsion), and the capital expenditure is estimated at £3 per h.p. This sounds low enough, but then he regards £2 per h.p. as sufficient for steam plant; so perhaps there has been a miscalculation somewhere.

Knowing and Doing

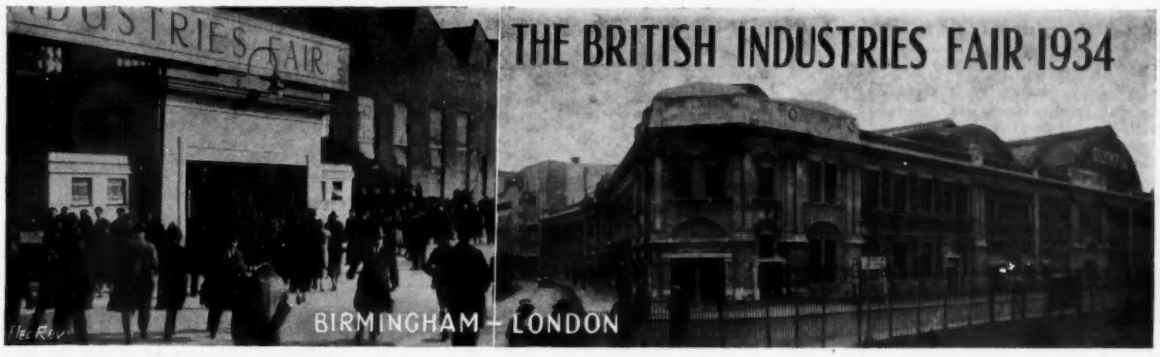
IN the paper which he read before the British Association, reported in our issue of September 15th, Dr. Schofield explained the scheme for blending theoretical with practical training that had been developed at Loughborough College. A 1,500,000-kV laboratory, with a steel inner cell, is now being built on the site of the old Loughborough fire station; but the students are not to have the joy of experimenting without the disciplinary education of working for it, and they are being made responsible for almost all the constructional work. Mr. Squeers's principle, that anybody who could spell "winder" ought also to be able to clean it, has much to commend it.

Calorific Value

DEFINITIONS of gross and net calorific value of fuel have been published as a British Standard Specification. No recommendation is made as to which should be used for comparisons of performance, but the British practice has been for years to adopt the gross value. Net calorific value provides an example of one of those specious attempts at accuracy that may be misleading. While it is easy to specify a value for the latent heat of the water condensed from the products of combustion, it has to be assumed at the same time that the whole of the hydrogen (the percentage of which in the fuel must first be known) has been reduced to water. We think, therefore, that gross calorific value is the more suitable standard.

Smoke and Education

THE London County Council spends £12 million per annum on repairing the damage caused to public buildings by smoke. It spends approximately the same amount on education. These figures were set against one another by Mr. E. M. Hood at a recent meeting of the Electrical Association for Women in Edinburgh. A very big reduction in the first should be obtainable by a very small increase in the second. Manufacturers and supply undertakings are lending electrical apparatus to public elementary schools, and many other schools are admirably equipped; but the L.C.C. might itself do a good deal more in providing the means whereby the coming generation may be fitted for modern conditions. It would, at the same time, do something positive towards saving money now spent on building repairs.

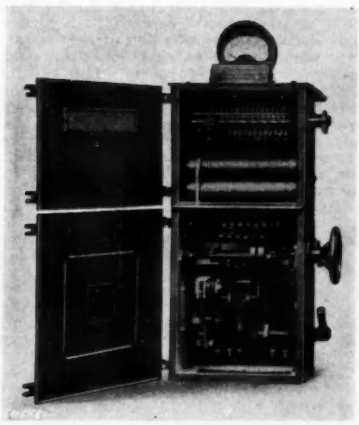


FEW institutions have stood so well the economic shocks of the past few years as the British Industries Fair. Again this year excellent and representative displays of British products have been arranged at Castle Bromwich, Birmingham, and Olympia and the White City, London. A particular feature of the Birmingham Fair is the greatly increased space occupied by the Electrical Section. The Fair opens to the public on Monday next and remains open until Friday, March 2nd.

W. H. Allen, Sons & Co., Ltd.

A wide range of modern mechanical, hydraulic and electrical engineering equipment includes a steam turbo-generator, steam turbine driven axial flow pump, steam engines, centrifugal pumps, generators, d.c. motors and control gear, etc.

A 150-b.h.p. two-crank, compound steam engine direct coupled to a 100-kW d.c. generator is of the vertical enclosed, forced-lubrication, double-acting type which is supplied in single-, two-, and three-crank units of from 10 to 750 b.h.p.



An Allen drum-type controller for a 25-h.p. variable-speed d.c. motor

The centrifugal governor operates a balanced throttle valve through a vertical rod, and the speed may be varied whilst running 5 per cent. above and below normal.

A 50-kW turbo-generator is suitable for use as a house set. The turbine is of the Allen standard single-stage impulse type, and is compact and robust. The set is designed to work at 220 lb. per sq. in. gauge pressure, with 200 deg. F. superheat, and to exhaust either to a condenser or against a back pressure of 25 lb. per sq. in. gauge. The designed overload of the set is 10 per cent. The turbine-driven axial flow pump comprises a single-stage turbine directly coupled to the pump. With this set the exhaust steam from the turbine is utilised for other purposes, so that high efficiency as regards low steam consumption is not vital; where low steam consumption is required a high-speed turbine is employed to drive the pump through reduction gears.

A single-stage, single-suction vertical circulating pump will deal with 748/860 gallons of water per minute against a total head of 50/60 feet. The main casing and impeller are of gun-metal and the spindle is bronze.

Control gear includes drum (illus.) and automatic types for constant and variable speeds. The panels are suitable for either floor or wall mounting, and the cases are made of stout steel plate with easily removable hinged doors, provided with inspection windows. Unit construction of the panels enables them to be built up to meet requirements.

Austinlite, Ltd.

The essential features of the 4½-kW fully automatic Diesel-electric generating set (illus.) are: Starting when the battery requires charging; battery voltage regulation, maintaining a constant line voltage on the discharge lines under varying battery conditions; shunt regulation, enabling a comparatively small capacity battery to be used; end-cell regulation, cutting cells out of circuit when they become fully charged; and stopping when the battery is fully charged.

W. & T. Avery, Ltd.

Besides weighing, counting, and testing machinery, various types of petrol meter pumps are manufactured, and a range of seats for office and factory workers is marketed by an associated company, the Tan-Sad Chair Co. (1931), Ltd. There is a working exhibit of an automatic weigher for continuously weighing any dry free running material flowing by gravity, and the latest electric visible weighers.

Babcock & Wilcox, Ltd.

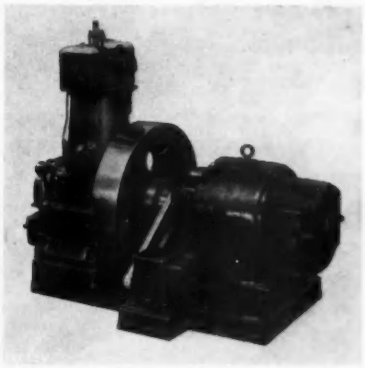
The new flash welded economiser consists of mild steel tubes flash welded at each end to mild steel head pieces, so as to form complete vertical staggered sections through which the water flows continuously backwards and forwards up through the economiser. Each head piece is fitted with a large forged steel internal pressure-held handhole fitting, and the sides of the head pieces are accurately machined to form gastight joints. The economiser may be arranged more than one section high, each bank of sections being supported independently.

A style 28 stoker, 14 ft. wide by 12 ft. long, partially linked up and in motion, has been built to the order of Messrs. Cadbury Bros., Ltd., for installation in their Bournville Works.

A full-size section of the S.X. type small tube sectional header, marine boiler is approximately 15 ft. high from the floor line to the centre of the drum, and is complete with mountings, refractory furnace and sootblowers. The oil burner has a comparatively new arrangement of air control, working on the pressure system of atomising.

The plate-glass type illuminated water gauge fitting has a casing with a coloured glass screen. Inside the light rays from a lamp are reflected to illuminate the top of the column of water with white light. The red glass screen is the background, and the bright column of water (meniscus) shows up brilliantly. Horizontal observation can be effected by two reflecting mirrors.

A full-size section of the standard B. &



An Austinlite automatic generating set

W. marine boiler is complete with an Erith-Roe stoker, in motion, and a Bailey furnace. The two-colour water gauge illuminator (illus.) has a casing behind the gauge glass containing a lamp and, in front of the lamp, a coloured screen of red and white glass, both colours being the full height of the casing. The screen is at a set distance behind the tube, so that the difference in refraction between the full and empty tube is made use of.

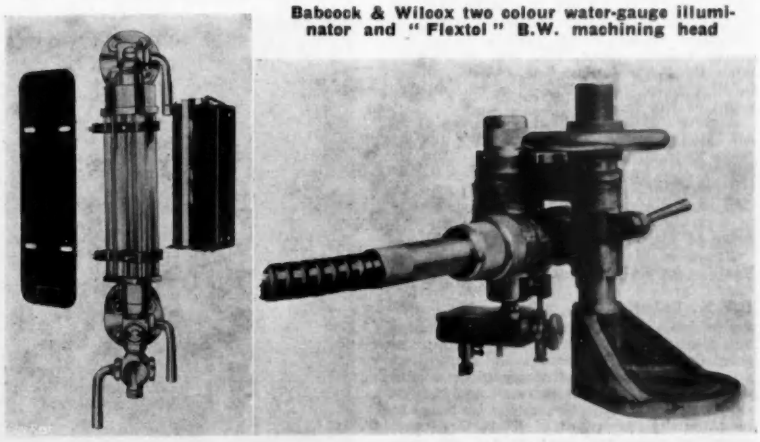
The company's subsidiary concerns—Stirling Boiler Co., Ltd., Spencer Bonecourt, Ltd., Edwin Danks & Co., (Oldbury), Ltd., Calorising Corporation of Great Britain, Ltd., and Erith's Engineering Co., Ltd.—are all taking part in the display.

Bakelite, Ltd.

Mouldings, &c., produced from bakelite materials include laminated sheets, rods and tubes, silent gear material, varnish, lacquers, soluble resins and varnishes.

In recent years the development of materials with such specific properties

Babcock & Wilcox two colour water-gauge illuminator and "Flextol" B.W. machining head



as a high resistance to water, acids and weak alkalis and to shock, has extended the existing wide sphere of usefulness of synthetic resin products, and mouldings made from these materials for special applications are displayed along with an interesting collection of mouldings employing normal materials. Bakelite laminated sheet is employed in the construction of the stand.

Baldwins, Ltd.

For the electrical industry there are many grades of steel sheets for dynamo and transformer work, and also steel stampings, including completed assemblies, finished laminations ready for assembly in stators and rotors, and various transformer types, as well as segmental stampings.

Beeantee Illuminations, Ltd.

A display with over 1,000 lamps depicts the easy assembly of "Beeantee" interchangeable festoon strip lighting without the aid of tools, screws or cutting. There are demonstrations of its numerous uses in conjunction with a number of animated electrical novelties, while concealed lighting, outlining of facias, trough letter signs, garland festooning, running chains of lights, multiple lighting for changing alternate colours in signs, window displays, etc., are all shown using "Beeantee" strip.

Belling & Co.

Two new fires, the "Sol-Ray" (illus.) and "Chrome-Ray," have 1-kW rod-type

The Belling "Sol-Ray" fire

elements focused in trough-type "endless" reflectors. The former (27s. 6d.) has feet secured to the lower parts of the reflector end pieces, and the latter (37s. 6d.) is suspended at about the focal line within a curved tubular stand frame with feet. There is also a wide range of inset fires and combined 2-kW fires and complete surrounds.

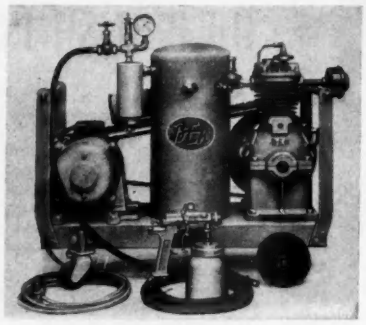
The cooker design introduced last year, with elements exterior to and inaccessible from the oven interior, is now common to three cookers. The middle size model has an oven cooking space of 13 in. by 13½ in. by 12 in. (2,000 W), and the hob equipment is an 8½-in. square, 2,000-W, boiler-griller, and an 8-in. diameter, 1,600-W boiling plate. The overall dimensions are 42 in. by 22 in. by 17½ in. deep. No. 42 model has a slightly smaller oven, a standard boiler-griller, and a 7-in. diameter boiling plate, and No. 45 model, with its larger oven, has a 7-in. round boiling plate in addition to the equipment of No. 43.

A new "Baby" cooker measures overall 13 in. by 14 in. by 8½ in., and has an oven 10 in. by 10 in. by 7½ in., served by 500 W. It has an 8½-in. square 2,000-W boiler-griller. A grill pan and grid, a deflector plate, oven shelf and two yards of flexible cable are all included in the price of 70s.

There is also a range of immersion heaters for fixing into existing tanks.

B.E.N. Patents, Ltd.

Besides a two-gun high-pressure vehicle-washing machine, air compressors driven by motors and controlled automatically, and paint-spraying outfits are made for most requirements, from a small set which can be carried by hand to large multi-gun plant. Electric motor, petrol engine, and belt drives are supplied and different types of spray gun include gravity, suction, and pressure-feed types. The transportable "Pneu-Spray" plant (illus.) is motor driven and mounted on rubber-tyred caster



A B.E.N. portable one-gun spraying outfit

wheels, being one of the latest single-gun combinations on the market. The "Pneumatic-12" two-gun plant is designed for spraying large areas quickly and is also suitable for operating pneumatic scrapers, riveters, and light chippers.

Berkeley & Young, Ltd.

The new 1-kW "Dinkie" fire is retailed at 17s. 6d. in a choice of four figured marble vitreous enamel finishes. It can be fixed direct to a piece of slabbing or tiled surround without the necessity of any excavations to accommodate it, or it will fit flush on to a flat surface as there are no projections beyond the back of the fire.

There are also displayed a wide range of fires of all types, the Nos. 1 and 2 "Nippy" cookers, and the "Deluxe," "B. & Y" and "Glyder" irons.

Berry's Electric, Ltd.

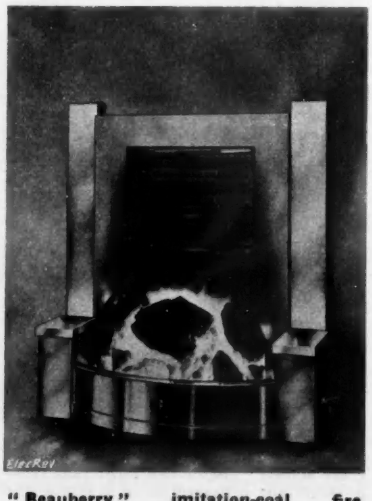
A few new and many improved appliances are to be seen on this stand, which is divided into four main sections. From one end of the stand to the other end there are, in this order, a water-heating room in which the "Canvary" and other Berry equipments are displayed. The "Canvary" water heaters are available in 1½-, 3-, 5-, and 12-, 15- and 20-gallon sizes loaded at 500, 600, 800, 1,000, 1,500, and 2,000-W respectively. These are of the non-pressure type with mixing-valve.

There is also a tastefully decorated and modern heating saloon showing at their best "Magicoal" and "Magi-Panel" fires; this includes the "Magicoal" range, containing the "Flectaberry," "Adjustalog," and "Beauberry" fires, all of which were introduced last September. The "Beauberry" (illus.), which is sold at £3 19s. 6d., is fitted with the company's "Plus" fuel, and is loaded at 2 kW. Standard finishes are oxidised silver and copper, but the fire can be supplied in art enamelled finishes at 4 gns.

A special compartment is devoted to the display of switchgear and instruments. Undoubtedly the outstanding feature of the exhibit is the modern heating room, which is practically a replica of the company's new showroom.

Birkby's, Ltd.

These makers of synthetic resins, varnishes, and powders produce a large and varied range of mouldings for the elec-



"Beauberry" imitation-coal fire (Berry's Electric, Ltd.)

trical, domestic, and general engineering trades, including telephone parts and wireless cabinets. Some of the largest mouldings manufactured by the company are being shown side by side with what are claimed to be the smallest mouldings produced in this country, as a demonstration of the company's wide range. There are also examples of "Elo" fancy and domestic coloured ware.

Birmabright, Ltd.

All cast and wrought forms of the "Birmabright" corrosion-resisting (aluminium) alloy include rolled sheet and strip, extruded bars, sections and tubing of various shapes, drawn wire, &c.

Birmingham Aluminium Casting (1903) Co., Ltd.

"Birmal" castings produced by the pressure die, gravity die, and sand casting processes are supplied to over forty different industries. These parts include electric drills, wireless variable condensers, automatic telephone selector banks, and vacuum cleaners.

Birmingham Battery & Metal Co., Ltd.

Representative examples of the company's production of large seamless copper and brass tubes from 6 in. to 18 in. inside diameter are such as are supplied for steam pipes and other engineering purposes.

Birmingham Electric Furnaces, Ltd.

One of four "Birlec" furnaces is a small "Brytreat" continuous belt-conveyor type for bright annealing demonstrations. Oxidation is prevented by keeping both the heating chamber and the water-jacketed cooling chamber full of a neutral gas. Through both chambers runs a continuous belt of heat-resisting wire mesh, carried on drums at either end of the furnace. The belt is driven continuously by an electric motor through a reduction gear, and variable speed gear, and its speed may be adjusted. Furnaces employing the same general principle are also constructed in the semi-continuous batch type and in forms in which the material, such as wire, strip, &c., passes continuously through without the necessity for a separate conveyor.

In a rectangular batch type furnace for annealing, normalising, carburising, and general heat treatment, a patented method is employed for mounting the heating elements, whereby they are maintained out of contact with the refractory lining of the chamber. In this way local "hot spots," due to shielding of the heating elements by the refractory, are prevented, and any possibility of chemical interaction being set up between the elements and fire-brick is avoided.

A small tool-room model for hardening high-speed steel employs non-metallic heating elements, and is capable of operating at temperatures up to 1,400 deg. C. Its special atmosphere control eliminates scaling or decarburisation by the combustion of small quantities of town's gas and air in a small chamber external to the furnace chamber itself, and the admission into the latter of the products of combustion. A secondary hardening or tempering furnace constitutes a new addition to the existing range of "Birlec" forced-air circulation furnaces for low-temperature heat treatment.

Birmingham Electric Supply Department

Apparatus of interest to industrial users includes power-factor correction equipment to ascertain the p.f. at which a complete plant is operating and provide the necessary correction.

An industrial rectifier for the conversion of a.c. to d.c. is described as the type of plant that will probably develop as the change-over in system proceeds in the city, and a battery-charging plant is shown because of the growing market for such equipment where a.c. supplies are becoming available.

There is also a small furnace for hardening tool steel, an electric welder, and a two-tier baking oven with top and bottom heating.

B.K.B. Electric Motors

Among the range of universal motors is a number of new and revised models, with and without reduction gear, to provide high, medium and low speeds, and suitable for practically every form of drive in all trades requiring fractional h.p. ratings (illus.). The larger sizes are particularly robust and form a most

efficient range of the latest designs for d.c. and a.c. single and polyphase sup-

A B.K.B. geared motor unit

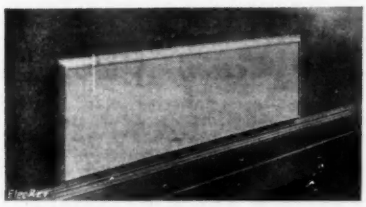
plies. Individual requirements of certain trades are catered for, and one speciality is a three-phase variable-speed fractional h.p. slip-ring motor.

S. O. Bowker, Ltd.

The "Tenbyluxe" switch (illus.) is designed for either surface or recessed mounting, but when used for surface work a specially shaped moulded plate fits right over it, giving it the appearance of a semi-sunk switch, since the projection is only ¾ in. The switch itself has a porcelain base, and two-way models have a shrouded bonding strip. The arc channels are liberally designed, the bearing washer is of hard grey fibre, and the bakelite bridge has a clean-cut metal thread. "Tenby" turret terminals are employed, the two-piece contacts being of phosphor-bronze. The reinforced "Erinoid" dolly operates a q.m. and b. movement with a specially tempered rustless steel spring. The bakelite box has "knock-outs" on all sides and at the back for twin flat or round cables. A one-way 5-A switch complete and a ring and a one-hole surface plate cost 28s. 6d. per dozen. The "Tenby" wiring system and its accessories are displayed.

Frederick Braby & Co., Ltd.

In the new panel heater (illus.) is a flattened rolled steel plate to which the elements, encased in a flexible refractory



A Braby heating panel

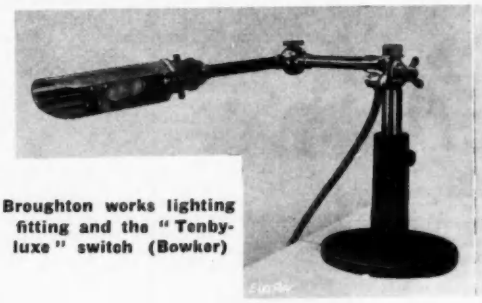
material, are fastened in untarnishable steel clips by small rivets. Thin mica strips afford extra insulation between the element and the plate. A mattress of special insulating and non-hygrometric material prevents loss of heat from the back, and is held in position by a galvanised back plate with its edges turned over on to the front plate. The whole is fitted into a steel moulding (wood in special cases) frame. Entry points are arranged for ¾-in. conduit. The panel is available in lengths up to 80 ft. in each of four heights—12 in., 18 in., 24 in. and 30 in., and for all standard voltages from 100 to 250. There are recessed and surface models, for both wall and ceiling mounting. The loading is 80 W per sq. ft.

Bratt, Colbran & Co.

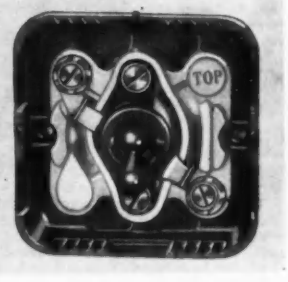
Among a large range of electric screen fires are several new items, including No. 37, mantel in light and dark Swedish green marble, fitted with a 3-kW fire (No. 45). Besides this there is No. 124, a 3-bar 3-kW screen fire; No. 121, which is similar but with one firebar; No. 808, an artistic wall panel model in Napoleon marble with a 2-kW radiator; No. 772 wall panel in reeded glass and marble surround, fitted with a 2-kW radiator in lustrous finish; and an unusual artistic model, No. 800 (illus.), fitted with a 3-kW fire.

Geo. Bray & Co., Ltd.

The company makes about 150 different standard sizes and models of immersion heaters for use in conversion schemes,



Broughton works lighting fitting and the "Tenbyluxe" switch (Bowker)



and for the heating of practically any type of liquid in industrial and manufacturing processes, as well as models fitted into some makes of water storage heaters and water boilers. There is in operation a domestic cylinder showing the simplicity of fixing and the automatic operation of a standard thermostatically controlled immersion heater. A varied selection of the high-speed boiling plates, which are made in a very wide range to meet the special requirements of British, Continental and American designs, is also shown. Many undertakings use these plates also for reconditioning.

Strip heaters, of which there are about sixty different lengths and widths, and which cover a wide range of loadings, are used as convectors for air heating, oven heating, etc., and as direct heaters when clamped to pans, dies, press platens, &c. A bakelite moulding press fitted to these strip heaters is in operation.

Various forms of ring heater includes the half-sheathed type, which is being increasingly employed for kettles, urns, washboilers, sterilisers, &c.

A comprehensive selection of blackheat radiators includes domestic, industrial, railway and ship equipments. They are supplied in plated finishes, or with cellulose metallic sprayed finishes in a large range of colours and shaded effects.

Cartridge immersion heaters (illus.) are designed for kettles, urns, sterilisers and appliances where the dimensions must be kept small, and where intermittent use is required. They all incorporate the company's construction wherein the nickel chrome resistor is embedded in a refractory body, and are loaded at up to 1,000 W.

Over 750,000 pieces of porcelain insulators and refractories are made by the concern each working day, from tiny beads to large tubes and articles of intricate design. Illustrations, photographs, and drawings of the varied applications of industrial heaters are being displayed.

Britannia Batteries, Ltd.

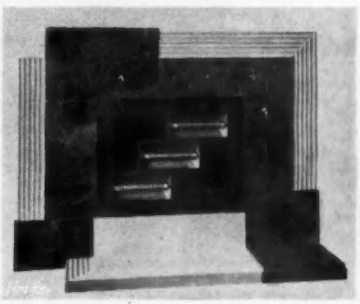
"Pertrix" blue "over-capacity" h.t. batteries are built specially for modern receivers, and there are models suitable for all the chief sets on the market. Torch, grid bias, and all forms of l.t. dry batteries embodying "Pertrix" patent neutral-electrolyte have strong recuperation, and maintained voltage.

The "PAC3" low-tension radio accumulator is a 90-Ah mass plate storage battery which will run a normal three-valve set for over a month without recharging. "Bulldog" sal-ammoniac dry batteries are also shown, as are lead accumulators of all types except car batteries.

Alkaline batteries are almost indestructible and are supplied for miners' lamps, vehicle propulsion, marine standby work, train lighting, bus starting and lighting, &c., and the recently introduced flat-plate models can be trickle charged. For overseas work there is the H. type alkaline cell (illus.) which has a large space for electrolyte above the cells, so avoiding frequent topping up.

British Central Electrical Co., Ltd.

The patent "Grippu" shockproof hand lamp has many uses in the garage, workshop, and home. It is priced at 10s., the lamp being enclosed in a wire cage and arranged to grip anything, leaving both



An artistic Bratt, Colbran mantel and fire

the user's hands free, a heavy bakelite base preventing access to all "live" parts.

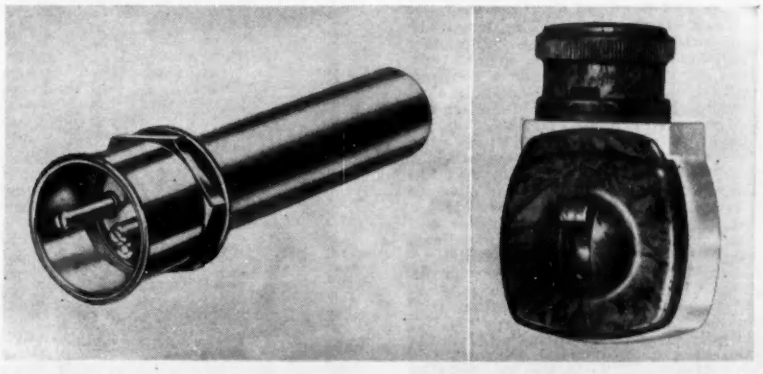
The flex emerges from the side, and encircles the grooved base, *via* the tunnel aperture, twice, preventing the flex from being pulled back, thus forming a most effective cord grip.

Besides the standard model another has a heavy fibre guard for use in proximity to uninsulated conductors; while a third is fitted with a well glass, ground on one side to act as a reflector, and is suitable for use in chemical atmospheres.

British Electrical Development Association

The kiosk comprising an electrical information bureau and a rest room in the electrical section is this year arranged on a much larger scale, and improved arrangements have been made for the comfort and convenience of visitors. A spacious lounge serves for writing and other facilities. The Bureau is again under the control of members of the staff who offer inquirers from abroad or at home detailed information regarding power tariffs and electrical facilities in general in various parts of the country.

Modern architectural lighting has been adopted on the columns and cupola, the

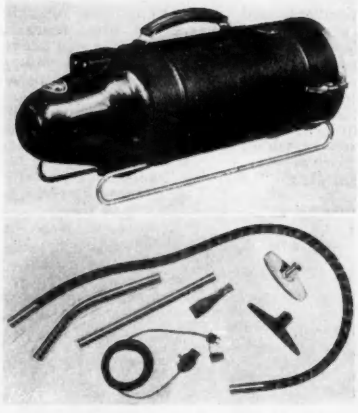


Bray cartridge element for kettles and C. H. Parsons "Little Briton" end-entry switchplug

balustrade is illuminated, and the lantern surmounting the cupola is clearly visible from a distance.

British Elec. Domestic Appliances, Ltd.

The "Mary Ann" vacuum cleaner (illus.) is of the cylindrical runner type with an enclosed dust bag and two



The "Mary Ann" vacuum cleaner

coupled turbo fans. It is being equipped with a new silent motor, which is completely insulated from the body of the cleaner, and the fact that the motor itself is surrounded by a bakelite casing affords a double safeguard against shock. The cylinder is covered with "Rexine" and the new range of accessories is particularly large for a machine priced at £6 16s. 6d. The makers concentrate on the production of one model, which is sold through the trade only.

The "Bedal" flat iron weighs 5 lb., and is priced at 9s. 6d. It has a thumb rest, wire heel rest, and an either-way (top or side entry) connector.

British Electric Welding Machines, Ltd.

There is an increase in the designs of fabricated frames for welding machines, which are united by means of arc welding and have extreme rigidity. Spot welders embrace machines from a very small new type of automatically operated 0.5-kW machine specially manufactured for dental work, up to a repeating spot welder which will give a continuously rated output of 22 kVA.

The "Watkin" dental welder (illus.) is being marketed in two finishes—one for use in the surgery and the other for use in the workshop. On the top and bottom electrodes is a capstan head in which are fitted four electrode points for the operator's selection for work in hand. The mechanical operation is through foot pedal controls, and the electrical circuit is controlled through a thermionic device by which a weld of regular strength up to the capacity of the machine can be always maintained without skilled operation. For ordinary spot welding work, the automatic control is put out of circuit by a tumbler switch. No. 5/33 automatic "Stronghold" flash welding machine is arranged for the rapid production of flash welded sections. Both the flashing period and upset are controlled by an electrically driven cam, the speed of which can be varied to suit the size of the stock to be welded.

An automatic wire welder can be easily arranged for portable operation, and the special method of control, which has fine adjustments, enables one type of machine to satisfactorily weld a very wide range of wire sections. A resistance rivet heater has a "gate" type operated switch for controlling the transformer tappings which give the necessary heat variation for a wide range of rivet sizes, and "stepped" electrode heads which easily accommodate both long and short rivets without spanner adjustment.

British National Electrics, Ltd.

No. C14 cooker (illus.) is one of the models with which the range has been recently augmented. It has the steam and watertight oven construction common to the others, and the elements are inaccessible from the oven interior and removable without the use of tools. The overall dimensions are 37¼in. by 27¼ in. by 26 in., and the oven cooking space is 18¼ in. by 16⅞ in. by 16½ in. The oven loading is 3,225 W, and there are 1,750-, 1,550-, and 900-W "Chromalox" boiling plates, in addition to a 1,800-W griller-boiler.

There is an interesting display of "Universal" appliances. These were originally manufactured in America and imported into this country in considerable numbers. By arrangement with Messrs. Landers, Frary & Clark, the American producers, all of these lines will eventually be manufactured and distributed by this company in respect of this country, the colonies and dominions. This display includes three models of vacuum cleaners, and also toasters, waffle irons, warming plates, &c.

British Oxygen Co., Ltd.

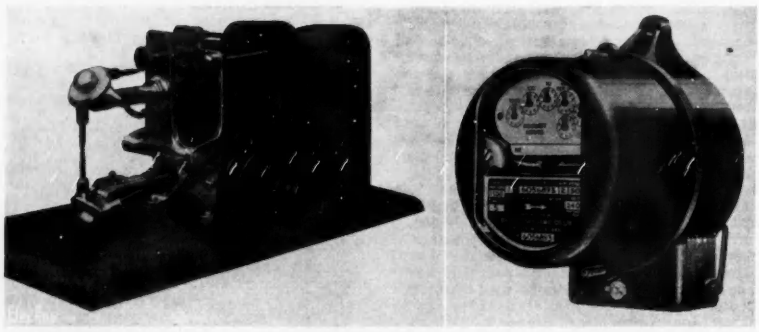
Electric welding equipment shown by this company includes a single-operator arc-welding unit, type W.A. (illus.) with accessories, and various types of ferro-arc electrodes for welding mild steel and cast iron.

British Sangamo Co., Ltd.

The single-phase type "HM" meter (illus.) is an improved type with a high torque and a low watt loss and is less affected by stray fields than the old "HE." Both the base and the cover are of moulded bakelite. Its components are mounted partly on the usual cast-iron grid and partly on a pressed-steel base plate, both of these items being dowelled together and mounted on three studs in the base of the meter. The terminals are mounted direct into the bakelite base.

The firm's prepayment meter type "H.M.P.P." will take either a shilling, sixpence, or penny in the same coin slot, so that a consumer is able to use whichever coin is to hand. A fixed charge collector attachment with which the 3-coin meter can be fitted embodies a type "G" synchronous motor, and the setting can be arranged in 1d. steps to collect any sum from 1d. to 3s. 9d. per week. As an alternative, a similar collector can be provided which collects from 2d. to 7s. 6d. per week in 2d. steps. The rate can be varied in less than a minute without removing the cover.

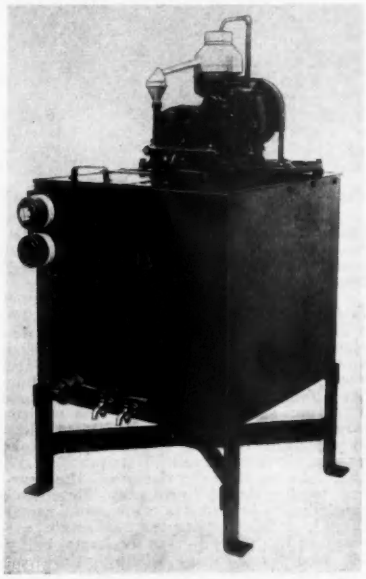
A polyphase meter with bottom connections has the new type "H.M." single-phase meter construction, but the base and case are of metal, the terminals being situated at the bottom and bakelite insulated. Time switches include a synchronous motor-driven switch, and an electrically wound model. The former is of the self-starting type, while the electrically wound switch makes use of the same type of synchronous motor, which is used to wind a main spring.



"Watkin" dental welder (British Electric Welding Machines, Ltd.) and British Sangamo type "HM" meter

British Separators, Ltd.

Typical of this range of "Vickcen" centrifugal separators and used-oil reclamation plant for industrial and marine applications, with capacities of from a few gallons up to 1,500 gallons per hour, is Type 60 machine (illus.). It is of medium size, and driven by a 1.25-h.p. motor through a special centrifugal friction clutch, which accelerates the speed gradually and prevents overloading of the motor when starting up. The collecting traps for the separated liquids are of cast aluminium alloy, and the discharge spouts are provided with automatically sealed sight glasses, so that no fumes are allowed to escape to the atmosphere. A rotary gear pump with an integral relief valve is fitted to the machine, and gear driven from the horizontal shaft.



The "Vickcen" centrifugal separator (British Separators)

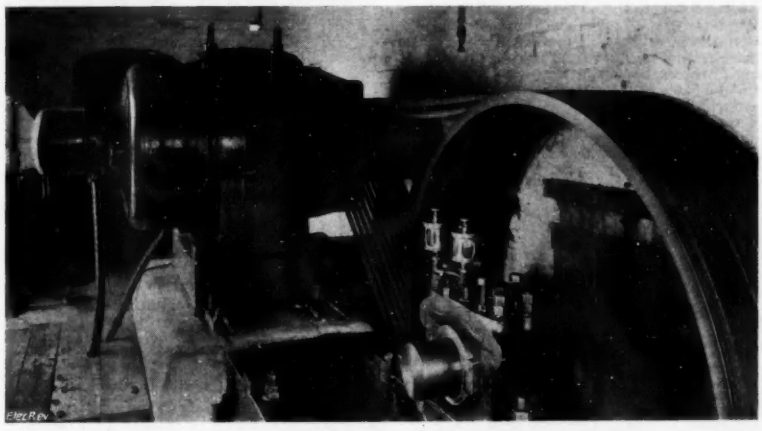
Self-contained purifying plant driven by a ⅛th or ¼-h.p. electric motor, mounted on a tank divided into two compartments, one for dirty and the other for clean oil, was specially developed for the reclamation of badly carbonised oils, by adding to the dirty oil compartment a coagulating medium, the two liquids being thoroughly mixed by circulation through the pump fitted to the separator and a spring-loaded agitator in the tank. An electric immersion heater of 2½-kW loading, controlled by a three-heat rotary switch, raises the mixture to a suitable temperature. When the coagulating process is completed, the feed valve on the

The British National Electrics "C 14" cooker

discharge side of the pump is opened, so that the mixture is fed to the separator, which removes the water and sludge.

British Thomson-Houston Co., Ltd.

The "Mazda Mercra" gas-discharge lamp is the dominating feature of the B.T.-H. exhibit, which consists of a stand in the electrical section and a demonstration of "Mercra" lighting along the roads on the south and west frontages of the Fair building. Four lanterns developed to accommodate this lamp are intended for street and outside lighting. The "Diral" and "Diron" provide directional lighting on traffic-frequented roads, the "Circra" gives a diffused illumination in all directions, while the "Veron," which is fitted with ordinary gasfilled lamps as well as a "Mercra" lamp, provides a compromise between the high efficiency of unadulterated "Mercra" and the warmer colouring of gasfilled lighting. The fifth lantern—the "Muron"—is a wall mounting fitting for interior use.



The B.T.H. "No-Lag" motor

In addition to this attractive "Mazda" lamp display there is exhibited on the Birmingham Corporation's stand the "No-Lag" power factor correction motor, with its appropriate control gear (illus.), driving a small d.c. generator for which a bank of storage batteries constitutes the load. Conveniently situated on the motor is a hand-wheel, which can be operated by visitors, which varies the brush position, and thus alters the value of the power factor. A meter panel just behind the motor carries a power factor indicator and two ammeters, one being of the recording type. These instruments may be observed as the hand-wheel is turned, and the power factor can thus be easily adjusted from an extremely low lagging value to approximately 10 per cent leading.

British Vacuum Cleaner & Engineering Co., Ltd.

This range of vacuum cleaners includes domestic models at from 5½ to 10 guineas. A new "Ideal" model is to be exhibited for the first time, which is claimed to be of unusual design and construction. At the same time certain models are being withdrawn from the market.

J. Broughton

The special feature of works lighting fittings (illus.) designed in collaboration with Mek-Elek Engineering, Ltd., is their compactness, which enables them to be fitted close up to the work, *e.g.*, on presses, millers, &c. Each fitting has a horizontal arm with a switch holder and a small reflector at one end, the arm being jointed in the middle. The other end of the arm has a special bracket which can be moved up and down a vertical pillar which is fixed to the bench or machine. Standard 15-W pigmy sign lamps are employed. They have large bayonet caps, and are therefore not interchangeable with motor car lamps.

Bulpitt & Sons, Ltd.

Two new fires, the 1-kW No. 705 and 2-kW No. 710, are listed at the competitive prices of 8s. 6d. and 10s. 6d. each in art silver and bronze finishes. No cast iron is used in their construction, and they are shaped of sheet metal by deep stamping and pressing. The element is well supported in a white refractory firebar, which has a rounded front and is fitted at an angle, thus providing upward radiation and avoiding the risk of scorching the floor or carpets.

The No. 325 table kettle (45s.) has been improved in appearance. The earthenware percolators introduced experimentally last summer have now been placed on the market and are obtainable in three colours.

Burnley Components, Ltd.

A comprehensive range of "Burco" wash boilers in various finishes includes a new family model wash boiler, No. 452 (illus.), which illustrates how low price can be compatible with good construction by means of modern press tools and production machinery. This boiler will meet the requirements of builders, supply companies and others interested in housing scheme equipment, where low price is essential. The "Burco" circulator is also displayed.

I. Calvete, Ltd.

The "Perfex" hair dryer (illus.) has a self-adjusting hood. The client has no switches to operate, all speeds and heats being under the control of the hairdresser. Earthing is claimed to be technically perfect. The maximum loading is 800 W and the price is 16gns.

The "Safex" permanent waving heater is provided with an air-tight element entirely encased in metal, so that it is free from oxidation. The equipment is of the "Sachet" type, but is adaptable to the oil process by the "Icall" attachment. Price: 19s.

There are various ranges of high-frequency apparatus, from the "Junior H" model at £2 17s. 6d. to professional models at from £4 10s. to £8. The "De Luxe" vibrator for home use, in bakelite, at £3 15s., is an all-British equipment. Fractional h.p. motors are also manufactured.

W. Canning & Co., Ltd.

In the "Quickstone" plating barrel (illus.) both the depositing vat and the swilling vat are of glazed stoneware, and the mechanical gear which operates the barrel is entirely separate. The barrel proper is of xylonite construction, and the only exposed metal surface is the actual cathode contact, thus eliminating the growth of deposit on exposed metal parts.

A rotary chrome plating outfit is semi-automatic, the articles to be plated being hung on the motor-driven revolving cathode ring and carried once round the plating vat at a speed which coincides with the required period of deposition. "Major" and "Minor" plating barrels are for mounting on a bench, and the idea has now been extended to a larger type, the "Maximum," which stands on the floor and will handle larger quantities and rather larger articles. The containers are suitable for any solution and can be changed from one purpose to another by substituting the correct spindle (with the anode).

The vertical rod and tube polishing machine has a vertical band dressed with suitable abrasive for the ground finish required carried over two pulleys, and the feed is automatic. A four-bearing polishing motor, polishing lathes, a centreless grinding machine, and low voltage dynamos and motor generators are also displayed.

Carron Company

In addition to the "Carronette" and "A" series cookers there is the new "Cadet" (illus.) which will cook for three persons. It is fitted with a combination grill boiler by which boiling, grilling and toasting can be done simultaneously and a meal can be prepared in a few minutes. The oven is heated by plug-in elements and is capable of cooking a 4-lb. joint with Yorkshire pudding or baked potatoes. The grill chamber is fitted with a drop door and can be used as a hot cupboard for warming plates, &c. The "Cadet" is simple in construction, replacement is easy, and maintenance is low. The overall dimensions are 31 in. by 16½ in. by 14 in., and an oven cooking space of 10 in. by 10 in. by 11 in. is served by 1,250 W. The grill-boiler is loaded at 2,000 W.

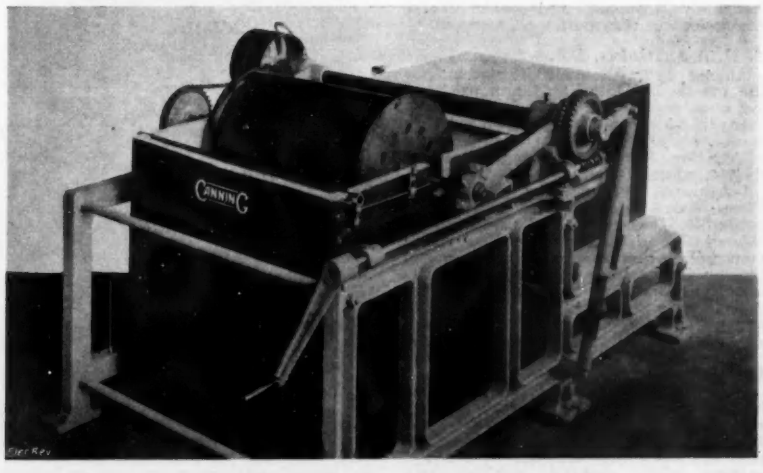
The company's two breakfast cookers are also in evidence, as are fires in a wide variety, ranging from the bowl to period models of the imitation-coal type. The "Inset" is shown in a new form of surround, while tubular heaters for low-temperature systems are also on view. Electric irons, nickel-plated and enamelled, and protector reset kettles complete the display.

Champion Sparking Plug Co., Ltd.

A new type of sparking plug effectually prevents radio interference caused by standard plugs. The suppressor is incorporated in the body of the insulator. The new service unit is a combination of air pressure tester and air cleaner. Much attention is given to 14-mm. plugs which the company produces for many of the leading car manufacturers. The "Extra Range" pattern insulator plug is a scientific design to ensure against pre-ignition, and at the same time check the formation of carbon.

Chloride Electrical Storage Co., Ltd.

In this display of lead-acid accumulators are the "Exide-Ironclad" type for locomotives, electrically propelled com-



The Canning "Quickstone" plating outfit

mercial vehicles, yacht lighting and general marine work, and the "Chloride" stationary type for power stations, country house lighting, and emergency use in theatres, large stores, and public buildings. The "Keepalite" system of emergency lighting for hospitals, cinemas, &c., employs an automatic control switch which, in the event of an interruption of the main supply, will at once switch the battery into circuit and maintain emergency lighting at selected positions.

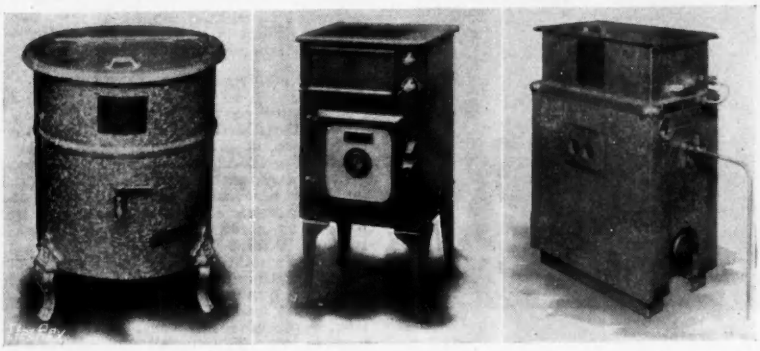
The smaller classes comprise radio batteries and accumulators.

Birmingham Information Bureau

The Bureau has full information upon the industrial facilities of Birmingham, particulars of vacant factories and sites, information as to electricity and other services available, labour and other matters of interest to manufacturers.

Clear-Hooters, Ltd.

Included in a range of high-frequency horns for automobiles, &c., model No. H.F.165 "Clarion" sells at 17s. 6d., complete with the necessary cable and push-button. It is supplied suitable for 6 or 12 V, weighs 2 lb., measures 4 in. in diameter, and is finished in ebony and chrome. Model No. H.F.100 "Clarion" measures 13 in. long, being complete with a trumpet, and weighs 2¼ lb. Complete with the cable, &c., it is listed at 27s. 6d. For light cars or motor cycles, "Q" horns are sold at 12s. 6d. Each weighs 1½ lb., is 4 in. in diameter, and can be supplied suitable for operation at 4, 6, or 12 V. No. H.F.225 has a plated grid-type cover. The "Cyclonette" for ordinary cycles is sold complete with flash lamp battery container for 5s. There is also a 4½-V model cycle model at 7s. 9½d.



The new "Burco" family wash boiler; the Carron "Cadet" cooker and an I.C.I. degreasing plant

Cooke, Troughton & Simons, Ltd.

In addition to a wide range of microscope and optical and surveying equipment there is the "Tavistock" theodolite, in which circles of small diameter are read directly by internal optical micrometers to one second of arc. Readings are taken simultaneously on opposite sides of each circle and automatically meaned, centring errors being thus eliminated. All observations are made from one position. The instrument is extremely compact and consequently convenient in transport.

T. H. & J. Daniels, Ltd.

Among hydraulic moulding plant for the plastic moulding trades, a pre-heating oven consists of six or twelve chambers, in which the tablets or powder in containers are heated to a temperature of 180 deg. F prior to being placed in the heated mould. This oven can be supplied heated by electricity. There is a 75-ton downstroke hydraulic moulding press fitted as a combined unit with an electrically driven automatic pump mounted on the baseplate with the press. The press has a prefiller valve, electrically heated platens, 14 in. by 14 in. and thermostatic control. The automatic pump is of the high- and low-pressure plunger type.

Dermatine Co., Ltd.

This company is displaying the usual large range of "Dermatine" products, such as hose, belting, valves, sheeting, &c., but for the electrical trade particularly there is a large selection of different gaskets, joints, packings and strip for electrical boxes. A variety of different moulded "Dermatine" articles as supplied to the electrical and wireless trades is a further attraction.

Dussek Bitumen & Turoleum, Ltd.

Compounds in solid, semi-fluid and fluid, bituminous and non-bituminous forms serve for use on all pressures from 66,000 V downwards in various qualities and at various prices. Equipment in which the company's products are employed has been lent by users such as Messrs. J. G. Statter & Co., Ltd., and Brookhirst Switchgear, Ltd.

A new class of material having high electrical properties and yet being resistant to oil of all descriptions is "Trinidite" OTR grade non-bituminous oil resisting compound.

M. C. Dizer, Ltd.

The new vacuum cleaner (illus.) is of strong construction yet much lighter than others of its type. It is finished in four attractive colours, with attachments to match, and is equally efficient for polishing floors or cleaning carpets. There is a zip fastener bag, inside which there is a paper container which retains all the dirt and can be thrown away.

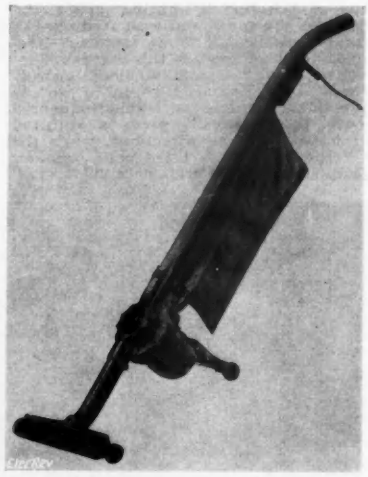
Earle, Bourne & Co., Ltd.

This is a comprehensive display of brass and copper film and special brass for clock wheels and plates; cold rolled brass alloys, the "Sebalin" brand of copper and aluminium alloy; solid drawn brass and copper tubes, and also plain, ornamental, round, square, oval, flat, twisted, and reeded tubes; polished and lacquered cased tubes for domestic furniture and shop fittings, &c.

Eaton Canadian Products (England), Ltd.

A new-comer into the domestic field in this country, this company has an attractive display of its latest cookers (illus.), and stresses its claims as to soundness of construction, with a view to low maintenance costs. There are several models with from two to four hob units, and the following outstanding features are common to all: non-mottled heat and acid resisting full porcelain enamel finishes in several alternative colours or colour combinations; plug-in elements employing phosphor-bronze blades and stainless-steel clips; quick-boiling plates which are claimed to represent a big advance in closed-plate design; speedy oven heating; a bi-metal spiral temperature indicator fitted to the oven side. A general objective has been to provide the smaller kitchen with those advantages which have hitherto only been obtainable where larger equipments can be used; indeed several features in the smaller models have previously only been associated with higher-priced equipments.

An Eaton Canadian Products cooker



The "Dizer" vacuum cleaner

Electric Radiators, Ltd.

"Classic" and "Marble Arch" cast-iron fires are of light and medium construction, respectively, and are each available in 1- and 2-kW sizes. The "Classic" costs 9s. 6d. in vitreous enamel finish, while the "Marble Arch" is priced at 21s., in bronze. The "Marlborough" model is a reflector and imitation-fuel fire, the elements being deeply welled at the foot of the back reflector behind the "fuel." A double flicker device gives a glowing-coal effect. In oxidised silver, bronze or copper this 2,500-W fire costs £2 17s. 6d. At 10s. 6d. (13s. 6d. chromium plating) the 600-W "Albion" is obtainable. Tubular heaters are available in lengths up to 6 ft., and the "Duke" toaster and "Sandwell" iron are worth inspection.

Electroflo Meter Co., Ltd.

A unique operating principle is claimed for an automatic temperature regulator (control pyrometer) (illus.) because the pointer has no work to do other than that of indicating the temperature. Its position with respect to the depressor movement determines the path to be taken by the selector pin, the path taken determining whether the mercury contactor switch shall be "on" or "off." In the case of electric furnaces the mercury contactor switch can be connected directly to the furnace contactor without any intervening relay for all circuits up to 50 A at 440 V.

An alternative instrument is the three-position controller giving high, low, and mid positions through a double step depressor with adjustable step, which can be employed with a trend analysing valve regulator of the two-motor type.

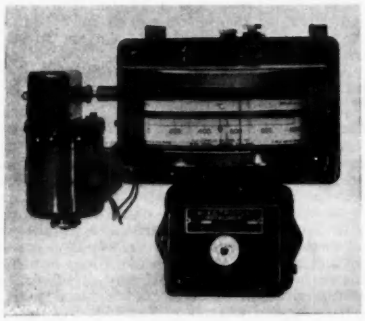
The a.c. synchronous motor-driven, continuous-strip pyrometer will record any number of temperatures from one to six. The chart is 6 in. wide and has rectangular co-ordinates. It lasts for 1,600 hours, and twelve hours of the record made is exposed through the glazed door. An automatic station indicator shows the number and location of the sensitive element in circuit with the recorder.

The "Electroflo" electrically operated distance-indicating and signalling system for application to waterless gasholders has a transmitter driven by a chain and sprocket. The rotation of the shaft raises and lowers a multi-conductor type of resistance in a fixed mercury well, thereby regulating the conductance of the distantly located electrical reading instrument, which shows the height of the gasholder at any instant.

Electrona Electrical Products, Ltd.

The "Duplextra" sander (illus.) is an electrical tool designed for treating flat surfaces, and consists essentially of two

rotating discs friction driven by a single spindle and carrying the abrasive papers. Provision is incorporated for ventilation and the prevention of dust entering the motor. The abrasive papers used are held in place by spring clamps and can be changed in a few seconds, while grit can be employed, according to the requirements of the work in hand. The control is through a thumb switch fitted into one of the handles, and the motor takes about 2 A. The machine is a useful tool for cleaning up wood surfaces, giving



An Electroflo automatic temperature regulator

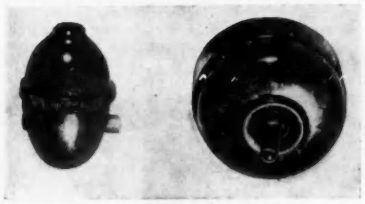
a smooth flat finish, free from ripple or markings.

The "Duplex" 75 electric floor polisher has two horizontally rotating brushes, friction driven from the armature shaft by a ¼-h.p. motor running at high speed. The machine has sufficient weight to give the necessary friction and is free from side pull on the floor.

The polishing brushes are held in place by two knurled screws easily detachable for replacing purposes, and a stationary outer brush sweeps any grit or dust away from the polishing brushes. The polishing brushes themselves are mounted on drums which carry the friction bands, and these revolve in bronze bearings actuated by a patented eccentric motion.

E. Elliott

Among a wide range of bakelite products there are a two-pin plug socket and a similar plug top, a two-way lamp



Two of the Elliott exhibits

adaptor, a 5-A two-way pear switch and a 5-A one-way tumbler switch, all available in brown or walnut colours. The display also includes a number of mouldings produced for the electrical trade.

Ellison Insulations, Ltd.

A selection of tubes, rods, and sheets for electrical insulating purposes and a variety of machined component parts are made of a material called "Tufnol," (illus.) made of paper or fabric laminations thoroughly impregnated with synthetic resin and baked under great pressure. The manufacturing process results in an exceedingly strong homogeneous material which can be worked with ordinary tools.

Several grades of both paper and fabric "Tufnol" are made to meet the wide range of applications of the material. The punching grade "Tufnol" gives good clean punchings without sign of splitting of the laminations; wastage of the punching grade is negligible.

Many components, made for or by the electrical, wireless, motor car accessory and allied trades from standard "Tufnol" sections are displayed, and bobbins of three varieties, solid moulded, machined and built up.

English Electric Co., Ltd.

Six cookers range from the "Cottage," suitable for up to five people, to the medium de luxe cooker suitable for up to eight people. Fires in 1-, 2- and 3-kW sizes are available in ten different finishes. The new 2-kW inset fire is available in many styles, at £1 14s. 6d.

An inset fire, similar in general construction, but made of sheet steel and chromium plated, is sold at £2 6s. 6d.

A 1½-gallon water heater and a 12-gallon pressure-type water heater exemplify the company's recent developments.

A comprehensive range of fuse gear incorporates a non-deteriorating cartridge fuse with a rupturing capacity exceeding 25,000 kVA at 50 cycles, 750 V.

Compound-filled high-rupturing capacity tailless-type fuse units have capacities up to 800 A and are designed specially for sub-stations and kiosks.

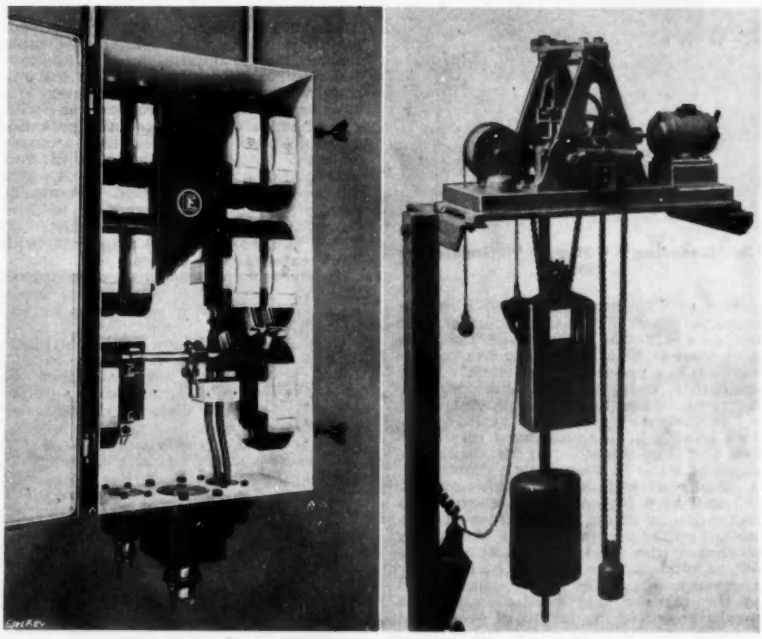
Universal fuse units for kiosks and sub-stations have the framework supporting the unit bolted direct to the wall, no space being required at the back of the board. All connecting up is carried out at the front. The cable box is detachable and of ample proportions, and the loose front renders the plumbing work a simple and quick operation. The tails from the cable box to the sockets, which are bolted direct to the fuse-handle clip contacts, may be made by continuing the cable tails suitably taped, or, alternatively, by copper bars connected to the cable tails inside the box.

Skeleton-type low-pressure sub-station distribution panels have been standardised by some of the largest undertakings.

Factory-type fuse distribution boards, incorporating high-rupturing capacity cartridge fuses (illus.) meet conditions required by existing regulations and permit rapid cabling. Cartridge-type fuse handles are now available in two forms of cartridge fixing, viz., "D," which has a domed end cap forming part of a common sphere of equal radius to the spherical seatings which are carried in the handle, one of the seatings being adjustable and fitted with a locknut, and "T," with tag ends, which has been specially introduced as it enables handles with various widths of contact to be readily manufactured.

The combination-type switch fuse is designed to enable apparatus of the highest possible standard to be offered at competitive prices; it is available in sizes varying from 30 A to 300 A.

There is also displayed a range of



English Electric factory type distribution board and (right) a Gillett & Johnston turret clock (London Section)

special fractional-horse-power motors.

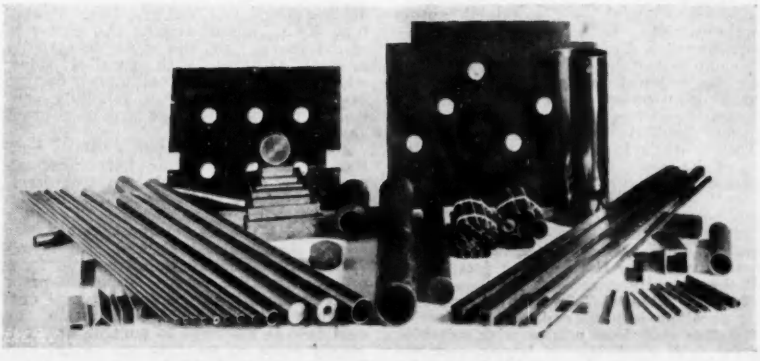
An "Otto" ozone water-sterilising plant for 100 gallons of water per hour is a duplicate of an equipment being supplied for a training ship.

All bacteriological and organic organisms in the water are completely destroyed by the ozone, but natural salts are unaffected and the "character" of the water is unchanged.

Eversheds & Vignoles, Ltd.

The new "Megger" capacity meter is a moving-coil instrument and has an a.c. hand generator. The readings are independent of variations in voltage and frequency, and low ohmic resistance in parallel with the capacity under test does not affect the accuracy of the reading. One instrument exhibited has four ranges: 0-0.3, 0-1, 0-3, and 0-10 mfd. A workshop type is designed for a.c. mains supply.

Another recent development, the recording "Megger" insulation tester (illus.), is suitable for testing armatures, field coils, transformers, etc., during drying out, the time taken being carefully checked, and the shape of the curve of insulation resistance showing clearly when the process is complete. Owing to the very small current used a "tapping" type of recording mechanism eliminates pen-on-paper friction. The standard "Megger" insulation tester movement is used in the ohmmeter, and the instru-



A selection of Ellison "Tufnol" products

ment scale is calibrated in megohms.

The "Megger" circuit-testing ohmmeter is a development of the "Weemegger" insulation tester, and is a general utility instrument for measuring conductor resistance, tracing circuits, and locating faults in windings. It weighs 2 lb., and consists of an ohmmeter and a small dry battery, the whole being contained in a moulded case measuring $5\frac{3}{8} \times 4 \times 2\frac{1}{4}$ in. There are two scales, a range switch being fitted to select either at will. Lower range instruments of up to 300 ohms are suitable for measuring the continuity of a circuit and for testing heating elements, motors, &c., and high-range instruments for reading up to 50,000 and 200,000 ohms are suitable for telephone and radio work.

In the Evershed self-protecting leakage indicator (Knowles-Shotter patent) use has been made of the characteristics of mumetal. The moving-coil rectifier-operated type of indicator or recorder is connected to a transformer and to a reactor so constructed that the transformer core becomes saturated when the leakage current reaches 10 A. Any increase in this current has practically no effect on the secondary current, and, therefore, no harm can come to the instrument.

A recording "Megger" insulation tester

The automatic plumb-bob system borehole level indicator provides a very accurate and simple method of measuring the depth of water in deep wells or boreholes. A small electrical element is lowered into the well by a two-core cable wound on a motor-driven drum. The motor is controlled by the element on the water line, so that as the level alters it either pays out or winds up the cable. The indicator and recorder are mechanically connected to the cable drum, so that a positive measurement of the length of cable, and therefore of the level of the water below the floor or other datum, is obtained.

Sir James Farmer Norton & Co., Ltd.

A fine wire machine for drawing all classes of wire from 40 gauge down to 50 gauge has been developed, and incorporates features not contained in the usual machine of this type. The spooling gear is of special design, and the traverse is designed to function in a horizontal position, thus providing an even lay on the spool.

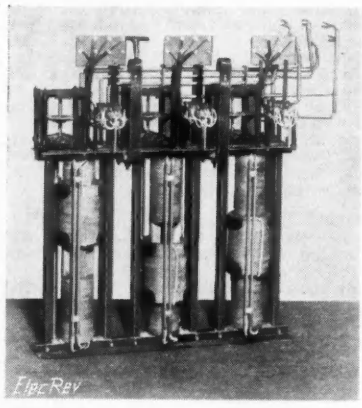
Special precautions have been taken to ensure that the general design is well balanced and without vibration. In accordance with modern methods, the machine is fitted with its own motor, the machine thus being a self-contained unit. Special cones have been developed and these are dynamically balanced.

E. C. & A. Ferguson, Ltd.

This range of British-made silvered glass "Eca-ray" reflectors is being offered at competitive prices in extensive and intensive, concentrating and focusing patterns. On the back of the crystalline glass reflector pure silver is deposited, on top of which there is a layer of copper, and finally a coating of heat- and damp-resisting varnish. The standard finish is aluminium and the reflectors are guaranteed for five years.

Ferranti, Ltd.

Additions to the company's range of miniature instruments include a multi-range a.c. test set, an ammeter and voltmeter mounted together in a moulded case with a hinged lid. It gives six voltage ranges of 0 to 7.5, 15 and 30 at 10 ohms per volt, and 0 to 150, 300 and 600 at 100 ohms per volt; and two current ranges of 0 to 0.5 and 0 to 5 A, which can be extended to 200 A and indefinitely by special and ordinary current transformers, respectively.



A Ferranti moving-coil voltage regulator

The movement of a 0 to 150-V electrostatic voltmeter is magnetically damped. The scale is clear and open, and the capacitance of the instrument at full-scale deflection is approximately 10 mf. A 0 to 12,000-V electrostatic voltmeter is mounted in the same wooden case with a fixed condenser employed as a potentiometer to permit the direct measurement of very high a.c. voltages, with four ranges of 0 to 3, 6, 9 and 12 kV. An a.c., d.c. test set in a moulded rectangular case provides multi-ranges up to 0 to 750 mA (d.c.), 0 to 600 V (d.c.), 0 to 600 V (a.c.) and 0 to 30 megohms (with 600-V external d.c. source).

This year's radio sets are exclusively of the superheterodyne construction incorporating the heptode valve as a distinctive feature.

In the new FLY and FLX polyphase meters a special disc with an insulated centre is used for a meter of either two or three elements which are suitably spaced round the disc, resulting in reduced weight and bulk and a minimum of wear on the jewel and pivot. Interaction between the elements is negligible. A terminal splitter block for use in connection with the F.L. single-phase meter overcomes the difficulty of bunching several circuits into the meter terminals.

The range of controlled frequency clocks for household use has been further extended; amongst the large clocks recently supplied are those at the Dunston power station, with dials 4 ft. 6 in. across.

Surge absorbers are now made in all sizes and for all operating conditions ranging from the protection of small household installations to the protection of the giant transformers on transmission systems of the highest operating voltages.

Correct use of moving-coil automatic voltage regulator equipment (illus.) makes possible very substantial economies in the layout of distribution networks and is finding application to many industrial purposes. The tail end booster is designed to adjust the voltage at the end of a feeder according to the load. The design and use of the static balancer are now receiving special consideration.

The new 1½-gal. self-contained automatic water heater is a non-pressure unit for connection direct to the supply mains. Its copper container lined with pure tin permits water from it to be used for drinking purposes. A new range of conversion units includes simple immersion heaters for horizontal mounting and circulating units for introduction into the top of the tank. Either type can be thermostatically controlled. The "Thermolator" is a self-contained thermostatically controlled circulator which will convert any hot-water system into an automatic electrically operated one. The flexibility of the element is a feature of all these equipments.

In the "Glowera" fire the heat-reflecting parabola is combined with a warmly attractive glow from a lamp with suitable filters and a reflector of beaten copper. The "Minera" fire is available in models loaded at from 750 W (one bar) to 2 kW (two bars). Panel and flush type inset fires are becoming increasingly popular.

George Finney & Co.

The 80-ton up-stroke prefilling moulding press and pump is claimed to present no risk of the press closing through faulty leathers or mechanical failure. Closing is effected by double-acting side cylinders, which on the closing stroke lift the large-diameter ram which draws slack water from the supply tank, high pressure being admitted for the final nip only. The press has a 10½-in. diameter ram working at one ton per sq. in., a 12-in. stroke, an 18-in. daylight, and is fitted with 18-in. square platens.

A 3-h.p. motor-driven high-pressure pump delivers 1½ gallons per minute. It is pressure controlled.

Flextol Engineering Co., Ltd.

A full range of "Flextol" tools and accessories, with recent improvements and modifications, includes the B.W. machining head (illus.) designed for machining faces which cannot be taken to a fixed machine; for instance, headers of water-tube steam boilers. It is driven by a flexible shaft. The complete equipment is a portable self-contained unit comprising an electric motor fitted with a three-speed gear box, flexible shaft and the head. The machining is performed with a small lathe tool with a special tip. The cutting tool is fixed in a holder which is adjustable to deal with diameters from 6 in. to 2½ in. The inner slide is automatically fed inwards across the face being machined 0.003 in. per revolution. The cutting tool is adjusted down on to the work and the depth of cut regulated by the rotating handwheel operating on the vertical pillar.

General Electric Co., Ltd.

The "Osira" lamp is now supplied for the following voltages: 200-210, 220, 230 and 240-250. There are also exhibited, together with the special equipment designed for use with them, tubular "Osira" lamps developed expressly for colour floodlighting purposes. Floodlighting by this method is employed to illuminate the end of the Fair building.

Representative examples of the range of mining equipment designed to satisfy H.O. requirements include a 25 h.p., 960 r.p.m. 500-V three-phase motor, with a particularly massive carcase, with no vents or relief valves, and with the terminal box and slip-ring cover shrouded by ribs or cup washers so that they can be unfastened only by a box spanner. A coal cutter (manufactured by Uskside Engineering Co., Ltd.) is of the chain type and built up from three self-contained units, the cutter gear head, electric driving motor, and feed gear-box. The 50-h.p. G.E.C. motor driving the cutter is of the barrel type, the stator comprising a steel cylinder, with parallel sides, which fits into the coal cutter casing. Starting and stopping is remotely controlled by contactor-type explosion-proof gate-end switchgear.

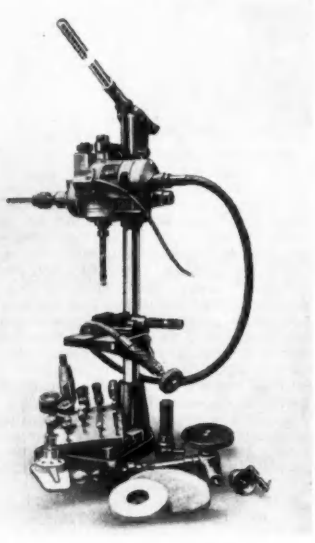
A G.E.C. double spindle polishing machine with a 5-h.p. motor

A double-drum scraper haulage consists of two steel drums driven through gearing by a 35-h.p. high-torque squirrel-cage motor, the whole being mounted on skids for flitting purposes. The rotor winding of the barrel motor comprises copper bars brazed to end rings, providing a practically indestructible form of construction. An explosion-proof switchgear unit for controlling coal cutters and conveyors which operate at the coal face is designed to control squirrel-cage motors at voltages up to 660 and for currents up to 80 A, and is mounted

in an explosion-proof steel chamber mounted on skids.

A neat double-spindle polisher (illus.) comprises a 5 h.p. 2,900-r.p.m. 400-440-V three-phase 50-cycle totally enclosed squirrel-cage motor mounted on a pedestal, the rotor and the two spindles extending from the ends being made from a solid steel forging supported by three roller bearings and one ball bearing, two bearings being mounted on each spindle. The two polishing wheels are mounted approximately 5 ft. apart, while the height from the floor to the centre line of the shaft is 3 ft. 4 in. A dust-tight hinged door in the pedestal gives access to the direct-to-line starter, which is push-button operated from the outside by two dust-tight buttons situated in the centre of the hinged door.

In addition to the company's smallest water-heater, a 1½-gallon non-pressure model for use over a kitchen sink or washbasin, there is a 12-gallon heater designed for either one point or general supply, and fitted with a tinned welded-copper interior. A 10-12-gallon rectangular cistern-type equipment offers special advantages where space is restricted. It can be fitted over the foot of a bath for a multi-point supply, and it dispenses with the need for an expansion pipe. In all these "Magnet" domestic heaters is incorporated a patent embedded-type element and patent quick-make-and-break bi-metal thermostat.



Duplex electric drill (Grimston Electric Tools, Ltd.)

A 400-kW l.p. electrode hot-water circulator is designed for full automatic control from thermostats, a time switch and a water-flow valve, and although it is not operating under load it is arranged in such a way that the working of the control gear is easily demonstrated. The automatic control gear includes means for maintaining a given output from the circulator, in spite of changes in water resistance which follow increases in temperature of the water.

The three distinct ranges of cookers suitable for the home, the overseas and the Continental markets, are all represented, all models being equipped with the "Magnet" quick-boiling hotplate. The standard equipment for the home market models includes a thermometer and splash guard, and a greycoat enamel finish. The elements on all models have been standardised. The domestic appliances staged cover a complete range for ordinary household requirements.

Gent & Co., Ltd.

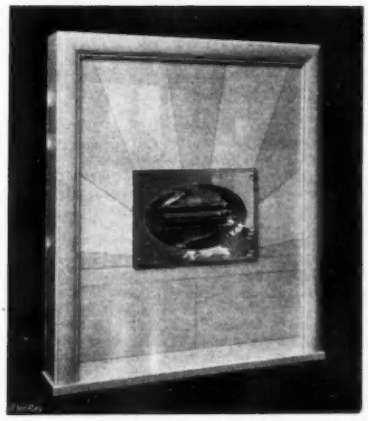
A "Pul-Syn-Etic" time transmitter controlling the clocks on the stand and approximately sixty in the exhibition is operated by an Exide sealed accumulator trickle charged from the a.c. mains.

A similar sub-transmitter fitted with relay "Reflex" pendulum control is operated from a prime transmitter for use in buildings separate from the main building, so that the time transmitters will continue to operate in the event of a "dis" in the overhead wires.

"Pyramid" twin pan specially constructed for use on hot plates (Hague & McKenzie, Ltd.)

An electric turret clock operated by a "waiting-train" movement is controlled by the time transmitter on the stand.

There is an electric hourly striking gear, for a 5-cwt. bell, controlled by the time transmitter, and an impulse marine-type time transmitter fitted with advance or retard apparatus for use on ships. There are also shown "Tangent" liquid level indicating, recording and alarm apparatus; "Tangent" luminous call systems; telephones, including the "Parsons-Sloper" intercommunication telephones, "Electro-Matic" central battery interphones, push-button call "Regent" telephones, and switchboards; process timing (illus.), idle machine and output recorders; sound signals and signalling devices; watchmen's clocks; relays; and fire-alarm apparatus.



A "Vitrolite" fireplace (O. C. Hawkes)

The new "Tangent" flame-proof signalling keys are certified by H.M. Mines Department as flame-proof, and suitable for mines signalling bells operated at a pressure not exceeding 25 V, or for the petroleum industry on a.c. or d.c. circuits up to 250 V. The two models are generally similar, with the exception that No. 1071 is arranged for operation by pulling the handle forward, this having been found not to fatigue the muscles of the operator during continual use.

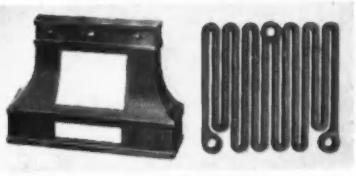
F. Gilman (B.S.T.), Ltd.

These flexible drive boiler-cleaning outfits include "Skatoskalo" machines for the external and internal scaling of tubes of from 0.5 to 12 in. internal diameter for every type of condenser, evaporator, economiser, waste-heat and water-tube boiler.

The new model "Satchel" set comprises a very light electric motor which is carried slung over the operator's shoulder; it has been particularly designed to meet the requirements of ship scaling work, and is also specially adapted for stone and cement dressing and for working in any other situation at a height above ground level. There is a new patented head for scaling or brushing small tubes of sizes between ½ in. and 2 in. internal diameter, and "Multiflex" machines comprising single drive, two, four, and eight speed machines, including portable sets with handle carriers, suspended machines, and machines for floor and bench mounting.

Gittings & Hills, Ltd.

Varnishes and the new "Fouramel" are durable and easy to apply, the interior qualities drying in four hours and the exterior grades needing eight hours to harden. Textural designs are obtainable by the use of "Stip-plex" plastic paint compositions. "Rockhard" synthetic enamel is a speciality which fluxes at the low temperature of 230 deg. F. for two hours, and gives a finish similar to vitreous enamel under low temperature stoving conditions and cost.



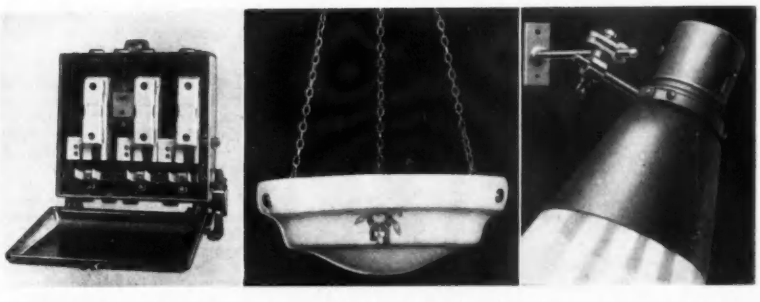
John Harper radiator and resistance castings

These synthetic enamels and lacquers are now made in four types in permanent colours. Grade "F" is heat-resisting up to a temperature of 350 deg. F. without discoloration. It is specially recommended for electric fire fronts and for all high-temperature purposes.

Grimston Electric Tools, Ltd.

Combination drills and grinders have ball-bearing flexible shafts for speeds up to 10,000 r.p.m., using 3-in. grinding wheels (illus.) Speeds up to 20,000 r.p.m. for small wheels can be obtained by gearing. The motor is hand wound, the gears are of special heat-treated steel, and the spindle is of 60-ton alloy steel. The machines are made in single-speed style for ¼ in. and ⅜ in., and in two-speed models for $\frac{5}{16}$ in. and ⅜ in., and ⅜ in. and ½ in.

Combination sanding and polishing machines are available in 7-in. and 9-in. sizes and have three speeds for flexible shaft driving. The backing plate and flat backing discs of spring material are mounted on a ball-bearing assembly which screws into the gear-box for 3,000 and 1,000 r.p.m. Hardened and heat-treated dogs transmit the drive, and the head can be changed from one socket to another in about 30 seconds. A complete garage and cylinder housing outfit (£33 18s. 9d.), pistol grip drills, and an auto valve refacer are shown.



A Henderson "Keyway" three-phase and neutral switchfuse, one of a range of Richardson painted bowls, and a Webb's Crystal Glass "Duroray" reflector

Hague & McKenzie, Ltd.

On an enlarged stand this company is again featuring an electric model kitchen, and the following special utensils for hot-plate cooking are recent additions to the concern's extensive range. A twin pan, an asparagus boiler, a high-class coffee percolator, and a girdle for scone and cake making, all have bases with a minimum thickness of ¼ in., and sides which have a definite relationship to the bottom, thus preventing distortion.

John Harper & Co., Ltd.

In addition to castings made of special heat-resisting iron and of non-magnetic iron, there are examples of electrical resistance grid castings, electric radiator fronts and frames (illus.), prepayment meter cases and cover, and selector frame castings for telephone work.

The company is primarily concerned with fine quality castings weighing from a few ounces up to five hundredweights. The principal features of the grey iron castings are accuracy of dimension, consistently fine finish, and elimination of subsequent machining.

An up-to-date and extensive plant affords finishes in dry majolica and spray processes, in plain colours and in mottled and fancy effects. Many different finishes and colours are shown applied to cookers and fires.

G. A. Harvey & Co. (London), Ltd.

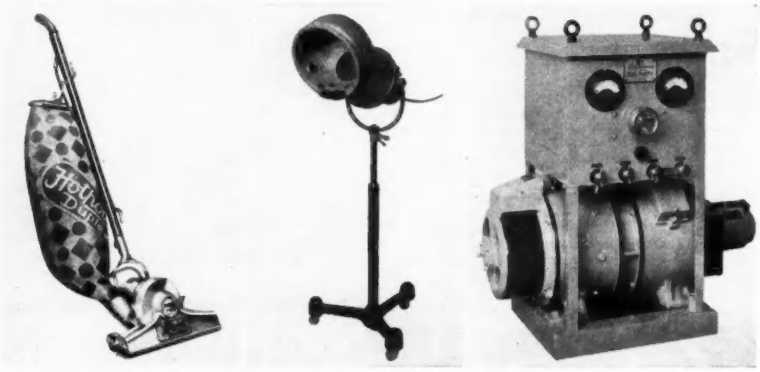
An extensive range of perforated metals is available in the innumerable patterns required for sifting, sorting, filtering and grading materials with slots of from 1½ by ¾ in. wide through 1/64-in. thick steel to round holes of 0.015 in. diameter.

Woven-wire "cloths" are made in all metals and gauges, besides such ornamental metalware as radiator covers, grills, ventilating panels and pipe guards.

The firm specialises in food preparation plant and makes vertical processing retorts, vacuum drying, evaporating and distilling plants, sterilisers, jacketed pans, exhausters, cooling tanks, &c.

O. C. Hawkes, Ltd.

"Vitrolite" mantels in various colours and complete with fires are a recent introduction of this company. Some of these have oval shape concave reflectors, each fitted with a rod-type element arranged vertically or horizontally. The fires proper are chromium plated and the coloured "Vitrolite" is relieved with black in some models. Fire No. 2080M has a wood architrave surround (illus.) which can be cellulose finished in any colour. A black and white "Vitrolite" fireplace with amber mirror strip is equipped with an imitation-fuel fire with the two element bars panelled beneath the deeply welled, recessed and reflectored "fuel." There is also a range of very attractive lighting standards.



The Hotpoint "Duplex" vacuum cleaner, "Perfex" hair drying equipment (Calvete), and the British Oxygen Co.'s electric welder

A Higgs motor

Henderson Electric & Wireless Service

New "Keyway" products (illus.) are a 15-A combined d.p. switch and fuse, and a switch splitter with four 15-A fuses and a 25-A main switch. The construction common to both of these units is a porcelain block with a bakelite cover with effective interlocking between the switch and the cover. The design of the "T L" series of switch-fuses and splitters embraces a bonding clamp at both the top and bottom of the unit for lead-covered cables (15-A switch-fuse 5s. 4d.). A switch-fuse with a tapped entry for conduit is available in d.p. models of from 15 A to 100 A capacities (500 V) and in t.p. models of from 20 A to 100 A capacities. A 60-A d.p. unit costs 30s. 8d. There is also a range of heavy-duty d.p. and t.p. switches and switch-fuses in capacities of from 30 A to 150 A.

Alfred Herbert, Ltd.

This display is divided between two stands, one devoted to engineers' small tools and workshop accessories, and the other to pulverised-coal firing and metallurgical furnace equipment.

Higgs Motors, Ltd.

This organisation has on show a comprehensive range of industrial motors in sizes from ⅛ h.p. to 50 h.p. (illus.) There is a range of fractional h.p. motors which have several exclusive features and high-class external finish, and they are particularly suitable for driving domestic equipments. A display of polishing and grinding motors, repulsion-start single-phase motors, and a representative show of component parts used in the manufacture of all sizes of motors is proving an attractive feature.

Holden & Hunt

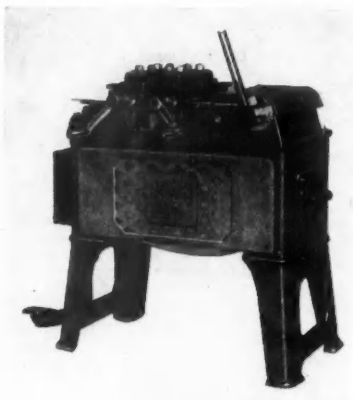
Among several low-voltage resistance welding machines of the spot, butt and flash-butt types the newly designed No. 5 (illus.) is shown for the first time, being of 30-kW capacity for flash-butt welding tubes, strip, sectional bars, angles and tees. Electromagnetic control gear has been recently patented, whereby the welding operation is made automatic by the simple pressure of a button, which maintains both pressure and duration constant.

The water-cooled electrodes have renewable tips of varying shapes that are now made of a special cadmium-copper, which is claimed to have a life of from eight to twelve times that of pure hard copper. All high-voltage parts are completely enclosed, the automatic trip switch has a wide range of adjustment, and the heating speed is controlled by a fully guaranteed multiple-way regulator. The machines are operated by a foot pedal, which is adjustable, and the ability to fit special jigs and stakes makes them very adaptable.

Nos. 1, 2 and 3 machines are completely automatic, with welding capacities of from 1/32 in. diameter to 2 sq. in. No. 1 is made of aluminium, so making it transportable, as it weighs only 40 lb.; it is of 1.5 kW, and can be plugged into a wall socket with safety. The No. 5 universal machine is hand operated with foot-pedal current control and a capacity up to 0.75 sq. in. area. The upsetting pressure is applied by an eccentric cam in direct line with the work being welded.

Hotpoint Electric Appliance Co., Ltd.

The washing and wringing machine which is made by the B.T.-H. Co. has been improved by the introduction of a one-piece base assembly, which not only adds to its appearance but also facilitates cleaning.



A Holden & Hunt butt welder

For the Model 196 "Junior" vacuum cleaner an improved design of floor-polishing attachment is now available. The new "Duplex" machine (illus.) is now identical in appearance with the "Junior" except that it is larger and designed for heavier duty; the side casters have been removed to the back of the base casting. The "Hotpoint de Luxe" iron has also a button-groove, a large thumb rest, through-bolt handle which remains cool, ball-hinged connector, attached stand, and flex support.

In a range of water-heating appliances incorporating the "Torribar" immersion heater are the constant hot-water unit comprising immersion heater, thermostat, three-way flange, and drain cock, and the new automatic and non-automatic circulators.

Wash boilers can be supplied fitted with either a 3- or 4-kW "Torribar" immersion heater. The inner container is air lagged from the body, which is made of sheet steel, the exterior being finished in cellulose enamel.

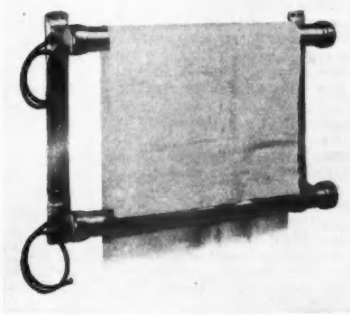
The B.H.154 radiant boiling plate glows red when in circuit and can accommodate three utensils at once, which need not be special for they rest directly on the coils with no intervening air space.

The two "De Luxe" cooker models are fitted with "Torribar" radiant boiling plates and oven elements, and a one-piece removable oven and grill chamber. For the "Utility" models there is now available an 8-in. diameter circular "Torribar" radiant boiling plate.

Portable fires include the chromium-plated reflector types of 1 kW and 2 kW capacity, together with imitation coal fires in various designs.

Hoover, Ltd.

Model 750 standard domestic cleaner for medium-sized houses, besides incorporating positive agitation, has a novel feature in the form of a two-speed motor



A Hufton towel rail

easily controlled by a small switch on the handle, the low speed being for light carpets and rugs. The price of this machine is £19 19s., and a complete set of dusting tools is available for an extra £3 3s. Several other models will be shown.

Charles Hufton & Sons, Ltd.

This company's latest electrical productions are chromium-plated wall-pattern towel airers (illus.) made up in both single and double patterns, the towels being hung directly on to the rails without any fear of scorching. The average size is 2 in. in diameter by 24 in. long, and the loading is 50 W. They are made up of solid brass throughout, and the chromium is deposited on a heavy nickel film.

There is also a good range of "Home Light" standard lamps for both table and floor use, and in some cases adjustable mirrors are incorporated.

Imperial Chemical Industries, Ltd.

The use of trichlorethylene for the degreasing of metals or machinery is extending so rapidly as to give special point to the exhibits of I.C.I. (General Chemicals), Ltd. The new electrically heated "Popular" plant is heated externally by twelve ½-kW elements operated by two switches and thermostatically controlled.

Ioco Rubber & Waterproofing Co., Ltd.

"Artoco" plywood panelling is suitable for the decoration of the interiors of motor vehicles, railway coaches, wireless cabinets, &c. It is made from specially treated plywood, faced with fabric impregnated with "Formapex" synthetic resin, and decorated with a variety of wood grains and fancy designs, giving a range of very pleasing effects. The material is waterproof, practically non-inflammable, unaffected by diluted acids, mineral oils, petrol and organic solvents generally, and easily worked and cleaned. The usual thickness is ⅛ in., and the standard sheet size is 4 ft. x 2 ft.

"Formapex" products (bakelite type), boards (cloth and paper), tubes, gear blanks, treated paper, "Linapex" insulating cloths, silks, and tapes, cable cottons, oiled paper, slot insulation, and adhesive tape are other items displayed.

Jackson Electric Stove Co., Ltd.

A recent addition to the "90" series of domestic cookers is No. 90J (illus.). It is smaller than No. 91J, and is intended for the smallest kitchenettes. It is fitted throughout with plug-in element units, and the hob understructure is removable without the use of tools. There are two elements on one frame on each side of the oven, and provision is made for bonding the earth wire from all the

Left: The Britannia H-type alkaline cell. Right: The Jackson "90 J" cooker

elements back to the main earth terminal in the switchbox.

Because only side heat is employed, cooking operations can be commenced on the floor of the oven, resulting in an effective increase of cooking capacity for each model.

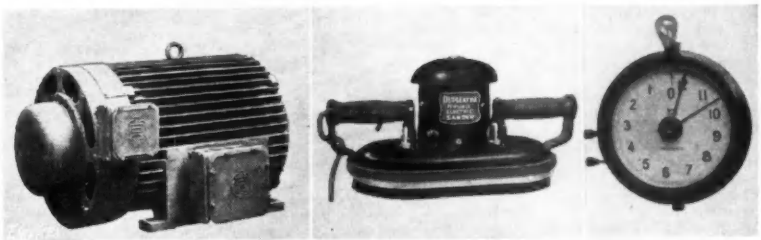
There is a complete range of portable light cast-iron fires, and three new inset fires for tiled surround fire-places. The latter are made in 1-, 2-, and 3-kW sizes, and finished in chromium plating and vitreous enamel.

The company's domestic storage water heaters conform to the E.D.A. Water Heating Committee's recommendations. A 10-gallon washboiler has the footpress switch mounted on the exterior case, thus rendering the boiler portable, so that it can be placed under a draining board when it is not in use. An alternative model is fitted with cable and a

The Klaxon type "UGH" motor

three-heat switch on a block, for permanent fixing on a wall. "Chromalox" elements are fitted to the base of each boiler.

A double compartment roasting grill, a double oven cooker, and a hot cupboard



The Crypto "Fankuld" motor, the "Duplextra" electric sander, and a Gent process timing clock

represent the company's restaurant and hotel apparatus.

Klaxon, Ltd.

A complete range of fractional h.p. motors and geared units embraces a modification since last year—the adoption of adjustable brush rockers so that all sizes over approximately 1/40th h.p. now have this feature. The company has also introduced a range of spur-geared units, including a heavy-duty model giving torque outputs of up to about 350 lb.-in.

The concern's products are now also incorporated in a range of small grinding and polishing units, and another innovation is a single-phase repulsion motor giving outputs up to about 1/6th h.p., the speed being variable from practically zero to maximum at constant torque.

Type "UGH" geared unit (illus.) is capable of exerting a torque of 2,000 lb.-in. at low speed. There is also a range of Klaxon industrial warning signals, including two new large syrens, with ranges in still air of ¾ mile and 1½ miles, and also a horn for operating on 50-cycle a.c. circuits, but giving a high-frequency note.

Lacrinoid Products, Ltd.

The chief features of this exhibit are the No. 333 "Light and Heat" single switch and the No. 555 double-switch adaptor. No. 300 combined junction box and ceiling rose, by simple manipulation, answers the dual purpose. There is also a separate junction box. Flush switchplates in 1- and 2-way styles of a new design are also shown, together with a range of "torpedo" switches in a variety of attractive colours, and switch plates in many colours to conform with modern schemes of decoration. Surface, sunk and semi-recessed switches, and 2- and 3-pin switchplugs are in evidence.

Lancashire Dynamo & Crypto, Ltd.

Flameproof barrel-type mining motors have been type tested at Buxton with success, and their special features include cartridge-type bearings, which are fitted to all sizes except the smallest. "Fankuld" motors (illus.) are of sturdy construction. The cooling stream of air is directed over the ribbed stator by a specially designed fan.

The new "P" gas-works motor has a ribbed stator frame and is specially designed for heavy duty in fume-laden atmospheres. Langham geared units include single-, double- and triple-reduction sets with reductions of as much as from 1,420 down to 15 r.p.m.

Fractional h.p. "Handigear" units with single and double reductions, permitting speeds as low as 70 r.p.m., afford suitable drives for small machine tools, &c.

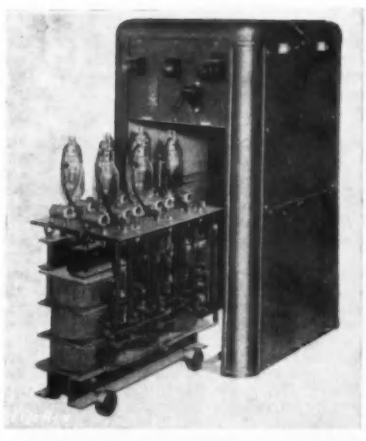
Valve rectifier battery chargers and constant potential sets are shown, and cinema valve rectifier units are available in outputs up to 300 A. The latter incorporate oxide cathode rectifying valves suitable for operation on 3-phase supplies. These equipments are capable of overloads up to 100 per cent., and are provided with a secondary voltage of 70/80/90, or, alternatively, 90/100/110. They give a smooth d.c. voltage and high efficiency with silence in operation.

A complete range of fractional h.p. motors includes repulsion and squirrel-cage motors for a.c. mains, and also d.c. motors from 1/6th h.p. upwards, all types being strictly interchangeable as regards feet, dimensions, shaft details, &c.

A special exhibit is a section depicting the construction of a 400/600-b.h.p. synchronous motor at present being manufactured for the Avon India Rubber Co., Melksham. This motor is designed for a speed of 96.7 r.p.m. on a 3,300-V, 50-cycle, 3-phase supply, and it will be used to drive two Banbury rubber mixers.

David Landale

The "Swifsure" saw is a compact, light, and strong self-contained tool with the sawblade completely protected by a swinging guard which automatically covers the blade as soon as the cut is finished. It is fitted with a riving knife, to prevent the blade from jamming, and



Oxide cathode rectifier (Joseph Lucas)

also with a ripping guide which enables any width to be ripped off accurately. The operating switch is situated in the handle. The ¼-h.p. universal motor is available for standard voltages, and the sawblade speed is 4,000 r.p.m. It is supplied complete with 15 ft. of c.t.s. cable and one general purpose sawblade for £13 10s.

Laurence, Scott & Electromotors, Ltd.

This is a display of d.c. starter switchgear and motors of different types. Burke-Scott d.c. arc welders are used extensively by this company for fabricating machine parts, which principle is carried much farther than is usual. For application to existing motors, the Heyland-Mossay-Scott exciter is available to pro-

The " Mprolite " wall bracket (Moulded Products)

vide flat-curve power factor correction. It also increases the pull-out torque of the machine and smooths out the peaks imposed on the supply mains. A similar principle is embodied in the new hypo-synchronous motor, which was described in our last issue.

Another new line is the " Red-Brand " of d.c. and a.c. motors made in sizes of from ⅛ to one or two h.p.; this represents an advance in single-phase design. The machine consists of a s.c. rotor with a double stator winding, (to one of which a capacitor (condenser) is connected in series to give it improved starting characteristics. The capacitor is cut out by a simple automatic switch when the machine comes up to speed, after which it operates like a plain squirrel-cage induction motor. The condenser is built-in integrally with the carcase without exceeding the usual dimensions, but is quite easily removable and is self-healing in case of breakdown. The design is neat, compact, and of extreme simplicity; there is no commutator, wire-wound rotor, rods, governor rods, brush-lifting gear, short-circuiting device, or external parts. It is started by a simple double-pole switch, is very silent in operation, does not cause any radio interference, and is mounted on rubber base blocks.

Lectrolinx, Ltd.

The improved " Clix " wall plug and socket, in various B.S.S. ratings, incorporates many important refinements. Previous models of the 5-A plug had separate bridge pieces, but those of the new model are pressed into the moulding and remain fixed, so that there are no loose parts whatever in the plug and the previous quick assembly has become much more rapid. Another efficient device is the cordgrip embodied in the larger plugs. In whatever form a two-way plug adaptor is used there is no risk of shock, and in the change-over from one use to another the points of contact remain undisturbed.

London Electric Wire Co. and Smiths, Ltd.

In a comprehensive range of bare and insulated conductors, prominence is given to " Lewbestos " wire for winding motors subject to high temperature rises, the asbestos covering being more resistant to heat than cotton. " Anacos " tramway and trolley-bus conductors were the first to be made in England of copper-cadmium, which improves their wearing properties. " Anacos " radio and general earthing rods are easy to fix, corrosion proof, and of high conductivity.

Besides some very fine sizes of copper wire for the radio and electrical industries, heat-resisting and fire-proof flexibles are made for shop windows, hospitals, and stage lighting, while " Lewcos Super Quality " enamelled wires make their first appearance. Other items are commutator bars, bus-bars, copper and alloy rods, strips, &c., manufactured in special shapes and sections; cotton, silk, and paper insulated wires, dynamo flexibles, and sundry other conductors.

Joseph Lucas, Ltd.

The major exhibits include Lucas-C.A.V.-Rotax car electrical equipment and accessories, " C.A.V." radio batteries and accumulators, Newton's and " Rotax " industrial and garage electrical equipment, including portable tools, high frequency and otherwise, and static rectifiers (illus.) charging equipment, and " Rotax " conversion machines, " Rotax " aircraft and radio electrical equipment and mines lamps. There is also a representative range of lighting, starting and ignition equipment to suit all types of cars.

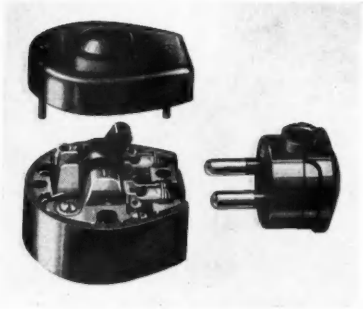
M. & C. Switchgear, Ltd.

This comprehensive display includes both industrial and flameproof circuit-breakers with complete metal-clad enclosures and complete oil immersion, including trip coils. As the calibration tubes are under oil there is no danger of rusting.

A recent introduction is a small oil-immersed, hand-operated, quick make and break, non-automatic, straight-on starter with fuse protection supplied largely for artificial silk spinning frame motor control, and adaptable for a variety of uses.

Contactor gear of both open and enclosed patterns for use on a.c. up to 660 V is claimed to incorporate features not to be found in any other design.

Typical examples are the " latched-in " and industrial " star-delta " starters.

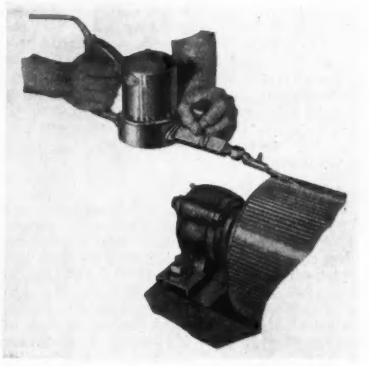


A " Nobridge " switchplug (M.K.)

A new production is a 7½-h.p. " straight-on " starter. Type A141 flameproof gate-end oil circuit-breaker is skid mounted and incorporates a B.S. plug. Type A256 flameproof remote control gate-end box is for the control and automatic protection of coalcutter, conveyor, loader, &c. Type A217 flameproof contactor pattern gate-end box also incorporates a B.S. plug and " start," " stop," push-button switch.

McKechnie Brothers, Ltd.

A wide range of samples of extruded sections in brass, manganese, bronze and white metal give an excellent idea of the many sections that can be produced by the extrusion process for the electrical



Martindale " Jiff-V " undercutter

trades. These sections are produced so close to required dimensions that machining is cut down to an absolute minimum and in many cases is entirely eliminated.

Ingots and anti-friction metals are other interesting items.

Donald Macpherson and Co., Ltd.

Products resulting from collaboration with the electrical industry include synthetic lacquer in stoving and air drying qualities for all types of electrical work, heating appliances, switchboards, switchgear, &c., and " Foochow " oriental lacquer, a heat-resisting stoving enamel suitable for the finishing of electric fires and cookers and other appliances in a wide range of colours and artistic effects.

The exhibits include a display of fires, cookers, and water heaters, finished in the oriental lacquer, and it is claimed that these finishes have completely revolutionised older processes and methods. There is a demonstration plant in operation, and visitors are invited to bring with them small articles to be finished under their own observation.

Martindale Electric Co., Ltd.

The company had been unable to display at previous Fairs " Commstones " for trueing commutators because they were then made in the U.S.A. Their production in England, however, practically completes the company's range of British-made products, which include also: Super-blowers, protective masks, the " Jiff-V " mica undercutter, commutator slotting files, " Commulac," voltage testers, &c. The new " Jiff-V " undercutter (illus.) has a " V "-shaped file (Sheffield made) which cuts a modified " V " slot and in consequence leaves no thin mica flakes at the sides of the slots. The specially made files are of special unbreakable quality steel. The new British model differs slightly from the American, and to comply with H.O. regulations has a 3-core cable with an earth wire.

Mavitta Drafting Machines, Ltd.

Drawing office equipment includes ball-bearing drafting machines for vertical and horizontal boards, as well as every description of mathematical scales in boxwood with celluloid edges and boxwood cased with celluloid. The last mentioned is made under Mr. Mavitta's patent, and it is unshrinkable and suitable for hot and cold climates.

Meldrums, Ltd.

The main exhibit consists of a boiler front upon which is mounted a patent " Koker " stoker, which is smokeless and gritless. The fuel is fed on to the coking plate by means of a ram in the form of a sector, the amplitude of which is controlled within very fine limits so that extremely close regulation of the fuel is obtained.

The Destructor Department is repre-

Moffats' " E 31 M " cooker

sented by a No. 1A steel-cased destructor lined throughout with firebrick. A large working exhibit is provided by the destructor in the exhibition grounds, which is keeping the grounds free from rubbish. The latest design of acid-resisting pump is of the double inlet design driven by an electric motor and circulating through acid-resisting piping and tank.

Midland Metal Diecastings, Ltd.

The " Thermidair " electric convector is at present available in the 1-kW size only, but larger models are to follow. It consists of a battery of copper tubes on to which corrugated aluminium fins are

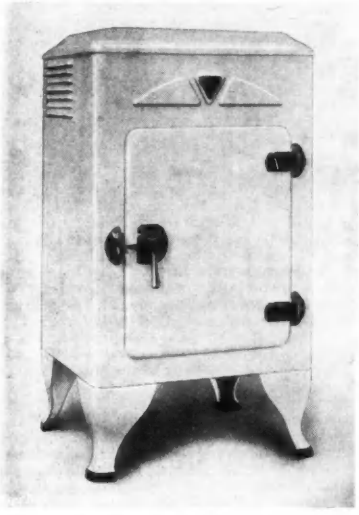
expanded. The element is made up of six resistances spirally wound and inserted lengthwise in grooves cut in porcelain formers, the whole element being held in place by a rod passing down the centre. These elements are loaded at 350 W per ft. All connections are brought out to one end and enclosed in a cast aluminium cover on which the switch is mounted.

The whole battery is enclosed in a sheet metal cabinet in order to create the necessary air current. The rising warm air is deflected out into the room by a baffle plate. The temperature of the air leaving the grille is 120 deg. F. The price is 4gns.

M.K. Electric, Ltd.

A comprehensive range of lighting and power accessories is chiefly concerned with domestic installations. "Nobridge" switches and switchplugs with arc baffles (illus.) have very high breaking capacity. For instance, on test the 5-8-A switch cleared 25 A at 275 V d.c., and the 15-A size easily broke 45 A under similar conditions. The 15-A interlocking switch plug will only take an ordinary B.S.S. plug. It is not merely a matter of B.S.S. gauge, as the third pin is not cut, grooved, or in any way mutilated. Any make of B.S.S. plug of the appropriate type is securely locked by an ingenious but simple locking device.

In the cooker control boards special attention has been given to safety features for the consumer. The boards are



"Prestcold 35" refrigerator (Pressed Steel Co.)

now standardised with a mechanical indicating device, which may be supplemented by the usual indicating lamp. For "off-peak" loads, there is a range of control boards embodying change-over main switches.

A fused "point box" is designed for looping 5-A sockets from a 15-A power point. The box should be fitted near the 15-A socket or switchplug, and looped from the live terminals. It is equipped with 5-A cartridge fuses, and the total maximum load on the looped 5-A sockets is limited to 5 A. It also forms an excellent connector for clock circuits. Fused safety adaptors are now fitted with cartridge fuses.

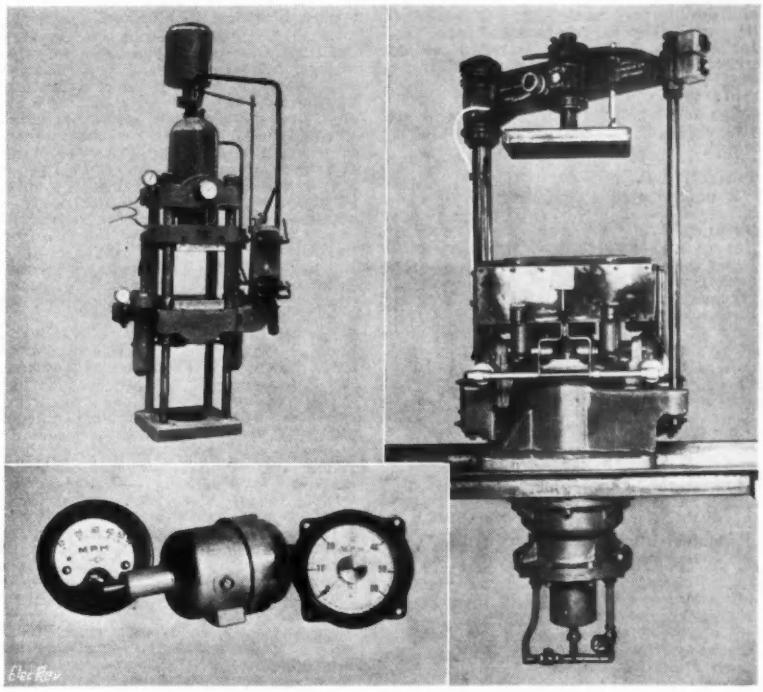
Regarding interchangeability with B.S.S. plugs, "MK" spring-grip sockets are shown fitted with different makes of plugs, and it is readily seen that good contact is made in each case.

Screening the live sockets is undoubtedly an excellent thing to do, as not only does it provide a larger measure of safety to the user, but the screens act as arc suppressors, as in the "Anti-Flash" sockets.

Moffats, Ltd.

Among the Moffat cookers now being made in this country is the "E 31M" table-top model (illus.) which has a warming drawer that is independently heated by a 500-W element controlled by a separate switch. It also has a hinged back splash which can be lowered to form a table top, as well as the "Therm-o-matic" control, which governs as well as indicates the oven temperature.

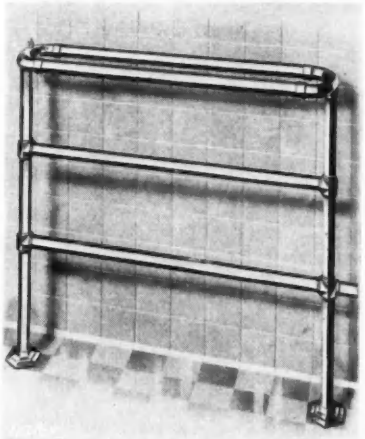
Model "E 28M" has a similar warming



T. H. & J. Daniels 75-ton moulding press; and (right) the "Pneulec" squeeze strip machine; an electrical tachometer (Record Elect. Co.)

cupboard. Housewives find this cupboard suitable for the rising of bread and baking of custards, and it is quite independent of the grill compartment or the main oven.

A new refrigerator has a porcelain enamel cast-iron base and a stainless porcelain top, while the body is finished in cellulose. There is a recess door with built-in racks which provide extra food capacity, and the hardware is made from "Kromoid," a new metal which, it is claimed, retains its brilliance perman-



The "Genii" towel rail (Geo. Nobbs, Ltd.)

ently. The freezing element is self-defrosting, and the cabinet is insulated throughout with "Dry Zero."

Moulded Products, Ltd.

Moulded bakelite products are made for many industries, including telephone receiver assemblies, complete radio loud-speaker cases, and electric lighting fittings. The "Mprolite" wall bracket (illus.), which is composed of four separate components that can be varied to give six or more distinct designs of bracket, can also be adapted to take standard tubular lamps. Simplicity of assembly is a feature, and the bracket is supplied in many colours to match interior decorations, including medium walnut, dark walnut, oak, black, mottled red, light walnut, orange and ivory, green and ivory, blue and ivory, brown and ivory, plain blue and plain green. The fitting is also adaptable as a ceiling pendant.

George Nobbs, Ltd.

The "NSC" cylindrical automatic calorifier is cork insulated and supplied in capacities of from 5 to 60 gallons with loadings of from 500 to 3,000 W. The heating element, thermostat, and cold-water inlet are fitted horizontally through the front at the bottom so that the tank can stand on the floor as well as on a shelf or brackets. In addition, a booster may be fitted about a third of the way down.

The cistern type "CSA" is rectangular, thus occupying minimum space, and the outer casing also remains. It is suitable for two or three draw-offs below the heater and is supplied in 3- to 30-gallon sizes with loadings of from 500 to 2,500 W.

The latest hexagonal "Genii" towel rails (illus.) are constructed of heavy-gauge solid-drawn brass tubing, 1.25 in. in diameter and tested to 100 lb. per sq. in. pressure. Prices range from £9 5s. to £15 10s., the largest being a combined towel rail and room radiator.

C. H. Parsons, Ltd.

New 5-A, end-entry two- and three-pin "Little Briton" switch-plugs (illus.) are introduced by this company. A colour range embracing eighteen standard finishes has been produced. A range of broad bevel bakelite switchplates in the same colours is shown, and the surface pattern front-entry rectangular switch-plug has been augmented by the addition of hollow back bases with cable entry and knockouts.

Rawlplug soldering iron

A new single cord ceiling switch has a smooth and positive action. It is available in one- and two-way, intermediate

and double pole models, and it can also be supplied in a semi-recessed iron box for industrial use, or mounted on a switchplug base. A new range of iron-clad industrial switch units in various types is on view, together with a full range of tumbler switches, bell pushes, single- and double-pole switchplugs, switchplates and lampholders.

Pneulec, Ltd.

A new jarr rollover pattern draw machine has a 26 by 42 in. turnover plate, pneumatic clamps for holding the mould during rolling over, and also an automatic roll-off and length of gravity roller conveyor. As the pattern draw cylinder reaches its lowest position, the bottom board comes into contact with the roll-

"Satchwell" type "Z" immersion thermostat (Rheostatic Co.)

off arrangement, the mould then being rolled automatically on to the length of conveyor without handling. This machine will jarr pipes 16 ft. long on end.

An electrically operated squeeze strip machine (illus.) is of the magnetic moulder type. It takes power direct from the d.c. mains and requires neither compressor nor hydraulic equipment. It will take a box up to 486 sq. in. With the corner guide rod principle employed true alignment between the pattern and the box during stripping can be guaranteed.

A sand mixing mill is equipped with a bucket loader and a new mill disintegrator. The beater principle is now incorporated. The "Royer" sand mixing machine works on an exclusive sand combing belt principle, which has the advantage of adaptability, low power consumption and unkeep and is practically immune from damage from scrap.

The "Silkysand" disintegrator embodies a 3-h.p. direct-coupled motor. Scrap shovelled into the machine passes through with the sand without causing any damage.

Pressed Steel Co. of Great Britain, Ltd.

"Prestcold" refrigerators include the following: Model 35 (illus.) 3½ cu. ft. shelf area 6½ sq. ft., 29 gns.; model 56 de luxe, 5.6 cu. ft., shelf area 10¼ sq. ft., 45 gns.; model 80 de luxe, 8 cu. ft., shelf area 14 sq. ft., 58 gns., and model 112 de luxe, 11.2 cu. ft., shelf area 21 sq. ft., 88 gns. All the de luxe models listed are equipped with a hydrator, foot-operated door control, interior lights operated by an automatic switch only when the door of the refrigerator is opened, and a vegetable bin.

Rapid Magnetting Machine Co., Ltd.

To this range of magnetic chucks and clutches, lifting equipment, and magnetic separators has been added the "Biflux" pulley, which is an improvement on the usual magnetic pulley in that an attempt has been made to minimise the neutral zone between the magnet poles through which pieces of iron could readily pass without being "held." This drum embodies two "fields," combining flat and penetrating characteristics, making it possible to separate large pieces of tramp iron weighing several pounds. The company intends to incorporate this dual field principle in every type of apparatus it manufactures.

Rawlplug Co., Ltd.

The standard model of the new "Rawlplug" soldering iron (illus.) has a 6-oz. bit, and the weight and length are 12 oz. and 12 in. Absence of threads in the heat-conducting part assists the flow of heat to the tip. The robust element is well protected by a refractory material and is connected to the wiring leads by binding screws, the leads being insulated by refractory beads. The iron is loaded at 80 W, is suitable for both a.c. and d.c., and models are supplied for three voltages: 230-250, 200-220, and 100-110.

Impregnated polishing cloths are also shown.

Record Electrical Co., Ltd.

Of chief interest among standard indicating and portable ammeters, voltmeters, insulation testing sets, and circuit breakers are five different patterns of electrical tachometers (illus.) for aircraft and marine uses, and such industrial applications as to printing presses, large machine tools, &c. The equipment is in two parts: a transmitter that generates a voltage proportional to the speed of the rotating body to which it is coupled, and an indicating instrument that may be placed at any distance from the transmitter and scaled to read in any terms of speed desired. "Cirscale" indicators have a scale length twice that of the dial diameter, evenly divided and visible at some distance.

For railways and road vehicles a cheaper and lighter tachometer is available. For testing the accuracy of existing tachometers, there is a range of portable precision electric tachometers, which consist of a lightweight hand-type generator with a separate indicator fitted in a strong teak portable case. Two- or three-range instruments are supplied, the standard ranges being 0-500, 0-2,500 and 0-5,000 r.p.m. A workshop hand tachometer is also exhibited.

In a range of portable insulation test sets with hand generators is the "Minor" miniature instrument, scaled 0-20 megohms, with a 500-V generator, and a scale of 2½ in. A larger pattern is provided with a constant pressure generator for 2,000 megohms at 1,000 V with a 4½ in. scale. It does not require any accurate levelling, and the overall dimensions are 12 in. by 5 in. by 4 in., and the weight is only 9 lb.

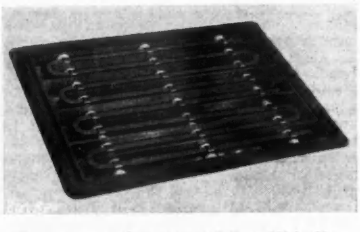
Revo Electric Co., Ltd.

A range of new automatic water heaters includes six sizes from 1½ gal.

The Revo "Electrawash"

(500 W) to 20 gal. (2,000 W) at prices from £4 17s. to £16 10s. The two smallest models are of the free-outlet type, and the others are also suitable for pressure use. The water container is of heavy-gauge copper spun in two sections and joined at the centre. The container ends are spherical and so permit high internal stresses.

Special tinning of the container inner surface resists the usual action of soft waters. The top half of the gunmetal alloy flange is held in position by a lip spun from the container itself, which engages in a recess in the flange, and the flange is as small as possible, consistent with accessibility, within the terminal chamber. Water inlet is by an approved valve with a full-bore anti-



The new "Superspeed" grill-boiler

siphonic inverted "U" tube, and the full-bore outlet has a siphon hood which allows a fair expansion of water upon heating up.

The nichrome element resistor is mounted on refractory formers so arranged as to prevent sag, the whole being housed in a tube of non-corrodible alloy. An adjustable air vent is provided on top of the outer case, which is of stout sheet metal, finished in hard stoved enamel. Impregnation has rendered the granulated cork lagging non-hygroscopic.

A range of cookers includes the Nos. 20, 30, 40 and 50 series; the "Family," "Domestic" and "Economy" models; and some patterns developed specially for the colonial markets. The "Superspeed" boiling plate has now been produced in the form of a rectangular grill-boiler (illus.), which can be supplied in "Revo" cookers, instead of the enclosed-type grill-boiler and separate "Superspeed." A specially designed deflector plate is available for use with the unit when one operation only is required. Flat nickel-chrome strip is again used for the element, which is housed in a special frame.

The "Superspeed" grill-boiler is only supplied as the specified part of the hob-equipment of a "Revo" cooker.

There is also a new 2-kW imitation coal fire known as the "Fyrelite," and priced at 41s.

Other apparatus includes boiling tables, rings, kettles, grillers, toasters, irons and fires, the last including new models with unusual burning coal effects.

A new wash-boiler is the "Electrawash" (illus.); the outer casing is stout-gauge sheet metal, heavily galvanised, and is ribbed and shaped to ensure rigidity and prevent steam and water traps from causing corrosion. The 10-gal. water container is of heavy-gauge sheet copper, heavily tinned on the inside, and all the joints are permanently watertight. Operation is by three foot switches, each controlling two of the six sections of the element. The elements are clamped in sections to the container base, and each section can be removed individually. A domed solid-copper detachable lid with a solid-brass handle is heavily tinned inside and highly polished outside. The overall measurements are 31½ in. high and 17⅜ in. diameter, the loading is 3 kW, and the price in all-galvanised finish is £3 3s.

Among the street-lighting equipment is a new lantern designed for use with gaseous-discharge lamps. Switch- and fuse-gear, fans, watertight fittings and reflectors, and traffic signals, road signs, guard posts, symbol plates and the latest "Revo" artificial-stone standards are also shown; while outside, in the "Quarry to Road" display, a portion of

A simple toaster (I. & M. Steiner)

the specimen roadway is lighted by the company's street-lighting equipment.

Rheostatic Co., Ltd.

The complete range of automatic temperature control devices includes room thermostats, immersion thermostats, automatic oil-burner controls, automatic coal-firing controls, central heating and air-conditioning controls, electrically operated valves, and relays. Type Z "Satchwell" immersion thermostat (illus.) is designed for automatic temperature control of electric water heaters and circulators, &c. The special feature is the extremely small size of head which is concentric with the stem. The capacity of the instrument is 15 A at

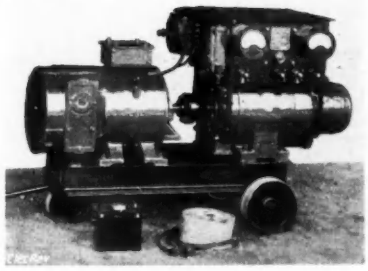
up to 250 V a.c. The design follows the lines incorporated in other thermostats of the same name. It is listed at 38s. and can be supplied with alternative lengths of stem and temperature ranges to meet all requirements.

"Satchwell" "WB" platen thermostat is specially designed for giving the close control of electrically heated platens used for bakelite mouldings. The price is 63s. "PM" "Satchwell" pulling motor has a loading of only 30 W. It is very simple in design and does not contain the orthodox type of wound commutator or brush gear. The complete device contains this little motor driving through gearing on to a low speed final shaft, and is mainly intended for use in conjunction with suitable controlling thermostats for operation of valves and dampers for central heating and air-conditioning control.

Steam motorised valves are intended for use on a saturated or super-heated steam up to 100 lb. per sq. in., and to work under the control of a suitable thermostat, allowing the application of automatic temperature control to heating processes, &c., where the heating means is by steam.

Henry G. Richardson & Sons, Ltd.

This company is displaying a wide range of lighting fittings, mainly for the



A typical Sure-Arc Electrode Co. welding set

home, including bowls, shades, reading lamps, &c. Excellent examples of cut crystal may be seen, while painted (illus.), etched and intaglio finishes are attractive features. There are many original designs and colourings, too.

Shropshire, Worcestershire, and Staffordshire Electric Power Co.

As in previous years, this stand is an information bureau, featuring the services which this company and its associate, the South Wales Electric Power Co., offer to existing and prospective consumers. The stand is designed on modern lines and illumination plays an important part in its decoration.

P. B. Sillimanite Co., Ltd.

"Sillimanite" bricks, shapes and blocks are used with economic advantage in all types of glass-melting furnaces, non-ferrous metal-melting furnaces, the combustion chambers of water tube boilers, heat-treatment furnaces, &c.

Henry Simon, Ltd., and Turbine Gears, Ltd.

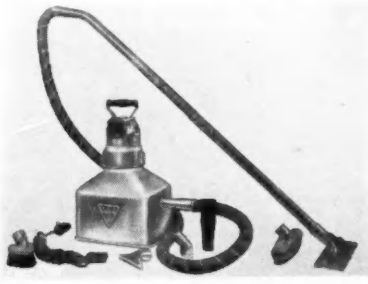
The "Synchroweigh" blending system demonstrates the recently developed method of blending materials by weight.

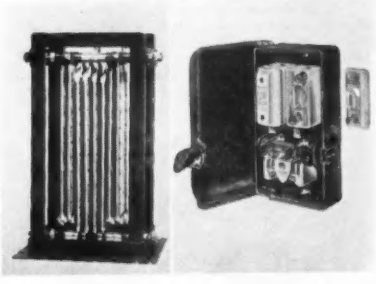
The system comprises a battery of specially designed electrically synchronised automatic fixed or portable weighing machines, an electro-magnetic totaliser and, where required, a presetting control unit which automatically cuts off the delivery when the quantity as preset has been weighed and delivered, and starts or stops any process or conveying units as required. When a number of different materials are being mixed from running feeds and where the failure of any of the sources of supply would spoil the ultimate blend, "Reform" automatic feed stream control apparatus can be fitted to control the supplies. The control units are electrically synchronised and should any one feed fail they immediately stop all the feeds, and at the same time indicate that the supply has been cut off. They may also be arranged to shut down any conveyors, feeders or measurers which are dealing with the materials.

On the section of the stand devoted to the products of Turbine Gears, Ltd., is a wide range of gears, and examples of speed-increasing and speed-reducing units.

Simplex Electric Co., Ltd.

The display of "Creda" cookers includes models suitable for the small family up to the requirements for a large canteen, and they incorporate the new





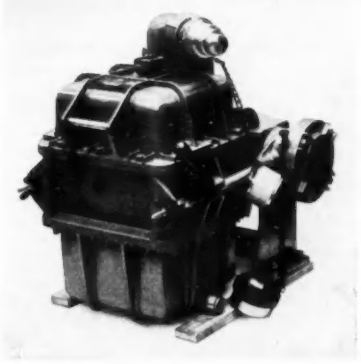
Welbeck vacuum cleaner, a Westinghouse experimental plate-type rectifier and the Tucker 15-A insulated d.p. switchfuse

"Duo" ultra-rapid boiling plate. A great variety of fires includes the "Cotswold," in which the heating elements are embodied in the curved bars of the grate, giving heat distribution over a very wide area. It also gives a realistic "burning coal" effect. Among the inset fires the "Inigo," an attractive modern design, is shown in an appropriate surround. Irons, kettles, water heaters, wash boilers, towel airers, and bathroom heaters, as well as a wide range of tubular heaters, are among the other domestic equipment displayed. There is a new group of "Simplex" pressed-steel conduit fittings in both lug-grip and screwed designs, the latter including a complete range of circular junction boxes. There is also a complete new range of cooker control units and 10-A distribution boards, as well as improved S.M.S. switches and switch-fuses.

Of the lighting equipment there are units suited to almost every conceivable purpose, and of particular interest are the ingenious and varied applications of local floodlighting. The new "Beam" lighting is low intensity panel illumination over a wide area. There is a big range of vitreous enamelled reflectors, lanterns for street lighting, and new models in flameproof and gas-tight lighting units. The flameproof fittings are designed to meet the requirements of the authorities for underground colliery lighting use, the gastight models being specifically designed for use in chemical factories, petrol stores, paint spraying shops and the like.

Henry R. Soutter, Ltd.

Typical of several electric sterilisers shown, No. 40 is specially designed for hard wear, and is constructed of high-



A Switchgear and Cowans gate-end starter

grade cast-aluminium. The body and sides, being of one piece, cannot be damaged if the steriliser is boiled dry. It is finished in highly polished aluminium and fitted with a specially designed mica element which is easily detached.

The equipment is loaded at 500 W, and boiling from cold takes from ten to fifteen minutes. Complete with two yards of flexible cable and an adaptor, the outfit costs 36s. At extra cost an automatic switch may be fitted. Household, laundry, tailoring and travelling irons; copper and aluminium kettles with a new design of element; and toasters are among the other exhibits.

I. & M. Steiner, Ltd.

Among a wide range of fires in oxidised-silver and oxidised-bronze finishes, and with loadings of from 450 to 1,500 W, retailing to the public at from 4s. 11d. to 21s., there are a special fire-screen model with the fire inset, and also a 1,000-W fire with a special flat top plate warmer with a cut-out switch.

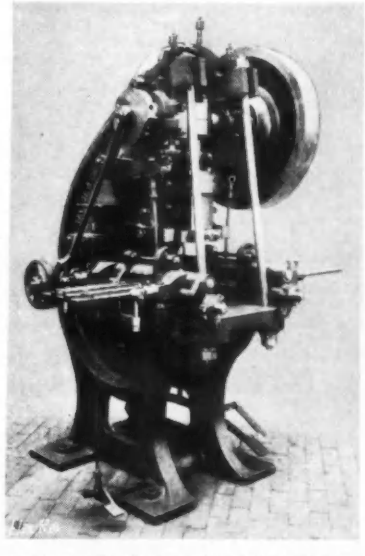
Other lines displayed include kettles and toasters, heat and light adaptors, "Miracle" plug adaptors, and bakelite table lamps.

Sturge & Baker, Ltd.

"Safety First" bed-warmers, towel rails, etc., work on the hot-air principle, so that no metal parts are exposed, and earthing is therefore unnecessary.

"Speedy" boiling rings are really quick-boiling because all cast-iron heat-absorbing parts are eliminated, porcelain being used in its place.

"Red Cross," "Red Rose" and "Maltese Cross" fires are designed to afford



Taylor & Challen double roll feed press

the maximum of heat directed outwards and minimum heat losses at the back of fire.

"Universal" cord absorbers are made in bakelite, brown, white and black. They will allow lamps to be fixed at any height and support shades of any weight. There are flexible absorbers for fitting to the bases of table lamps and floor standards, which wind up automatically all loose trailing cable.

Sunderland Forge & Engineering Co., Ltd.

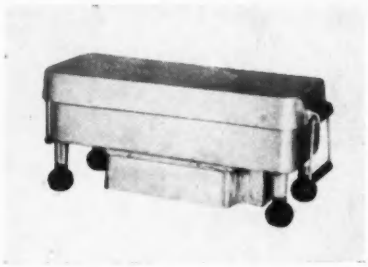
The simple principle of the "Sunderland" vibrating screen is the loosening and stratifying of the material by imparting a series of rapid vibrations at right angles to it as it travels over a woven wire or punched plate screening surface. By the simple operation of a handwheel the intensity of vibration may be varied whilst the machine is operating. This adjustment, together with control of the inclination of the screen, permits precise treatment.

The mechanical vibrator is driven by a 1½-h.p. motor, especially designed to

withstand vibration. The motor is connected direct to the vibrator by a flexible coupling. Screen sizes are available from 4 ft. square up to 12 ft. long by 6 ft. wide, single or double surface.

Sure-Arc Electrode Co., Ltd.

There is displayed a very wide range of electrodes for all classes of work, but the outstanding feature is the new method of electrode construction. This is first evidenced by the very smooth external surface of covering, and secondly by it being possible to remove the blue asbestos only by tearing it off in irregular form. The covering can-



"Soutterware" No. 40 steriliser

not be unwound, for the new method of applying the blue asbestos does not involve winding.

The company's wide range of welding plant is also represented. The special generator winding has alternative tappings by which definite loads are obtained without the use of resistances, &c.; the quick drooping generator characteristic permits the operator to strike arc easily and quickly; and laminated split poles afford a time lag between voltage and current of less than 1/10th second.

Switchgear & Cowans, Ltd.

Recently introduced "Trubicle" switchgear is a combination of the truck and cubicle designs intended for use where compound-filled gear is not desired. It has all the virtues of S. & C. metalclad compound filled internal isolation switchgear (Whitehead system), including precise mechanical manufacture, easy accessibility and rigidity, together with the lightness of construction, economy and space-saving qualities of the cubicle. A feature of importance is that the circuit-breaker is always on the floor and the framework of the cubicle does not in any way support its weight.

The new remote controlled airbreak drawout gate end starter (illus.) is a solenoid operated contactor for controlling coal-cutting or conveying machinery. The switch is opened and closed by push buttons at or near the motor through the usual earth and pilot cores. This equipment is adaptable for combining into mothergate switchboards for any number of circuits. The switch is arranged for complete isolation and can be conveniently removed for inspection or maintenance.

Other exhibits include 11,000 V, 150,000 and 250,000-kVA oil switch units incorporating the principle of internal isolation (Whitehead system) ring main isolators, withdrawable and fixed types; also cable test plugs, oil immersed switch fuses for pavement pit installations in high-voltage distribution mains, instrument transformers, mining and industrial switchgear, plugs and sockets, &c.

P. W. Taylor.

Several types of Gordon electric delivery trucks are to be seen on this stand. A description of the construction and operation of these appeared in our issue of January 19th. The Metro-Vick motor is fed from a 60-V Ediswan battery which is large enough to permit of a thirty-mile run on one charge. The control is simple and convenient.

Taylor & Challen, Ltd.

Of the presses exhibited, those most interesting to the electrical engineers are a high-speed notching press for armature plates capable of working at 700 strokes a minute, and a roll feed press (illus.) for the rapid production of stampings and other work. This is representative of a type of press made for pressures from 2 to 75 tons, some of which have been worked successfully at speeds as high as 400 per minute for blanking out.

An adjustable stroke press is shown with six strokes between ½ in. and 3 in. A bench press has also been brought out for doing light work in the making of wireless components, etc.

Telco Products, Ltd.

The "sight check" valve is equipped with an indicator which shows at a glance when the lid is open, whether the valve is open or shut, and in addition there is a sight glass through which the flow of steam or liquid can be observed. The body is made of gunmetal, all parts are renewable, and the valve is suitable for all pressures not exceeding 250 lb. per sq. in.

The "seat-in-sleeve" valve is a new product designed to reduce maintenance.

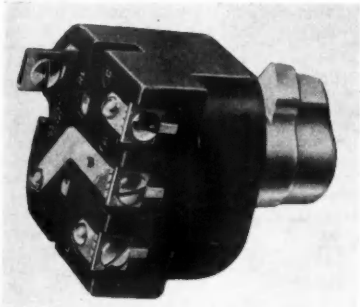
Telegraph Construction & Maintenance Co., Ltd.

Representative components and accessories depict the supply, manufacture and laying of impregnated p.i. h.p. and l.p. power cables in all standard designs or to customers' special requirements. The company's range of magnetic and heat-resisting alloys—mumetal, rhometal, radiometal, 2129 alloy, pyromic and calomic—are represented by a wide range of typical applications, such as current transformers, voltmeters, ammeters, relays, "Telcon-Plymax" screening boxes, &c.

Further items represented are submarine cables, dielectrics, broadcast relay cable, compounds, gutta percha such as "K-Gutta," "Telconite" and "Telconax." A feature of special interest is a section of the original cross-channel cable, manufactured and laid by the company in 1850, alongside a specimen of the Anglo-French 1933 cable.

Tok Switches, Ltd.

The design of the new "Kubic" cooker switch (illus.) enables any number of switches to be mounted in line close together. There is a selection of reciprocating switches, with bakelite covers and porcelain pointer keys, and



Tok Switches "Kubic" cooker switch

an extensive range of non-reciprocating switches, in addition to two- and three-circuit switches housed in metal covers with bakelite keys. The 600-V "barrier" type and single- and double-pole switches are all built with bakelite covers and porcelain indicators and reversible keys. "Tok 4" heat switches are specially designed for more accurate control of heats in electric cookers, and rotary snap switches ensure safe control of the simplest or most complicated electrical apparatus. There is a switch suitable for practically every cooking, heating and lighting purpose.

J. H. Tucker & Co., Ltd.

A special display of l.t. galvanised ironclad gear treated with the new "Telacizing" rustproofing process and "Tuckamel" rust-resisting medium includes iron boxes which, screwed in exposed positions on the decks of a liner, have travelled to South America and back, and also iron parts subjected to extremes of heat, cold and damp, acid and alkali fumes, and continuous salt spray. "Tuckamel" also has the unique property of readily adhering to, and preventing "spotting out" of, cadmium plating.

Special attention is given to the proofing of domestic ironclad gear which is not vitreous enamelled, and all iron parts are sandblasted, rustproofed, and also given two coats of "Tuckamel," each coat being thoroughly stoved at 200 deg. F. The company is prepared to rustproof other manufacturers' products.

The 5-A "Spartan" flush switches incorporate the same robust q.m. and q.b. mechanism as the surface and semi-recessed patterns. The 3½-in. wide plate provides an extra wide overlap and the standard depth square box accommodates either a switch or switch-plug without alteration. The 15/5-A "Spartan" dual-point switch-plug unit offers a 15-A convenience outlet controlled by 15-A "Spartan" switch mechanism, with an additional 5-A socket point.

"Four Entry" plugs have "knock-outs" to accommodate all sizes of twisted, circular braided and c.t.s. cables up to 16/012 gauge. New semi-recessed ceiling roses are designed for use with any known make of universal and B.S. conduit box, and supplied as 2- and 3-plate patterns.

The 5-A indicating control units have been extensively used in laundries attached to hospitals and similar institutions, enabling the overseer to have fuller control of apparatus in use. "Avon" cooker control units are similar in design to the "Ultraneat" type, but with modified subsidiary circuit equipment for installations where full equipment is not required. A "semaphore" indicating device can be incorporated in "Ultraneat" and "Avon" control units, replacing the pilot lamp.

New 15-A "Stelac" teak cased fuseboards are of reduced size, neat and unobtrusive, but allow adequate wiring space. "Stelac" fuse units are sold separately for incorporation in cookers, charging boards, &c. In a new 15-A tumbler switch the contact arms are insulated from the mechanism by a piece of porcelain insulation.

A 15-A d.p. insulated combined switch-fuse (illus.) has been designed for use in conjunction with insulated wiring systems where t.r.s. cable is normally employed, and due to no earthing protection being provided it is necessary that all accessories, including the main switchfuse, should be of the insulated pattern. The switch action employs a rotary movement, and with the aid of a wing type operating handle the action is rendered very smooth in operation.

The general characteristics of the 15-A, d.p., i.c. splitter unit are similar to those of the d.p. insulated switch-fuse. The 5-A, 250-V "Titan" insulated tumbler switch entirely replaces the original type of "Titan" switch. It incorporates a shallow projecting ridge on the surface of the central dividing partition of base, which, in co-operation with the spring plunger, definitely avoids the possibility of the circuit being broken slowly.

Turbine Furnace Co., Ltd.

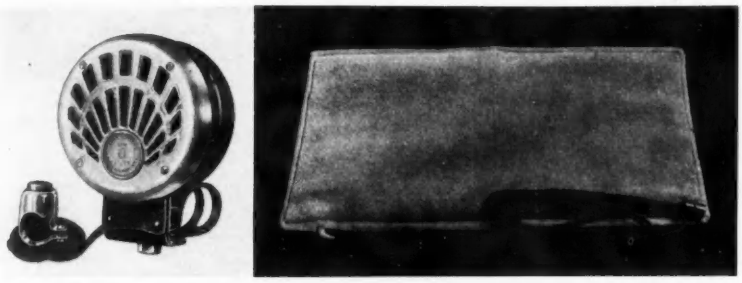
There is a full-size "Lancashire" boiler front with the left-hand furnace tube equipped with the "Turbine" furnace and the new modified extension cleaning-out grate—"Centre Bar S.M."—as well as trunking arranged for use with a forced draught fan. On the right-hand side the furnace tube is fitted with the "Turbine" furnace having steam jet forced draught.

When steam jets are employed the amount of steam does not exceed 2-2½ per cent. of the evaporation of the boilers, while for forced draught fans the power is extremely small, being generally less than 2 h.p. for a standard 30 ft. by 8 ft. "Lancashire" boiler evaporating 9,000-10,000 lb. of water per hour. The ordinary standard design of "turbine" extension cleaning-out and secondary air admission grate is built at the back of the grate, before the bridge.

The "Vandalite" table heater

Turner Manufacturing Co., Birmingham

A patent coupling for connecting flexible metallic tubing to cable armouring, switch boxes, &c., effects a considerable saving in fitting time and makes a much more satisfactory joint than the usual screwing method. The flexible armouring tube is simply laid in the bottom half of the split coupling and the top cap screwed into position. These couplings are made of a brass alloy, sherardised to prevent rust, and are available with a female screw-thread at both ends for connecting flexible tubing to conduit, and also with a male thread and two lock nuts at one end and a female thread at the other for connection to switchboards, &c. These couplings are made with internal diameters of from ⅜ to 2.25 in., and water-tight flexible tubing is made as well as the ordinary variety.



A "Clearhooter" type Q motor cycle horn and "Thermega" mat (Olympia)

United Steel Companies, Ltd.

Cold worked steels in strip and wire form include welding wires for electrodes in special alloy and stainless steel qualities. Messrs. Samuel Fox & Co., Ltd., are supplying the new lacquered steel in a range of fifty standard colours with glossy or matt finish. The strip can be blanked, stamped and perforated without the lacquer chipping or flaking. The new "Phœnix" (standardised) rapid machining steel, produced by Daniel Doncaster & Sons, Ltd., can be machined at speeds up to and beyond 400 ft. per minute.

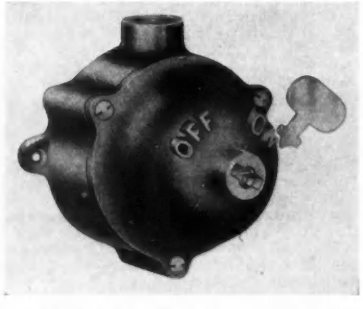
Vac-Tric, Ltd.

The enclosed cylindrical "De Luxe" suction cleaner retails at 12 gns., with a storage cabinet and set of accessories, including a disinfecting pad. An improved model is being introduced. The "Popular" is a smaller cleaner priced at £6 12s. 6d., the cylinder being fitted with sleds instead of wheels. The motor is mounted on rubber cushions to make it silent and shockproof. "Model H" is listed at £9 19s. 6d., and is guaranteed for two years. It has an upright handle and external dust bag.

A. Vandam & Co. (1933), Ltd.

"Invicta" fans are available with from 8-in. to 12-in. blades and universal type motors. Each fan is fitted with a three-speed regulator in the base. Fractional h.p. motors are of the universal type and range in size from one-sixth to one-eighthieth horse power. The new "Senior" model vacuum cleaner has the plug on the end, instead of on the top, and it is sold at £5 15s. with accessories.

The "Vandalite" table heater (illus.) is designed for keeping hot plates, tea and coffee pots, &c., actually on the table. It is therefore of attractive design and its appearance is helped by a lamp housed within the framework. Other items displayed are time switches of various kinds and in sizes up to 50 A, hair dryers, &c.



Walsall Conduits neon safety switch

Walsall Conduits, Ltd.

The "Walsall" neon safety switch (illus.) complies with I.E.E. Regulation 145A for luminous-discharge tubes. The key cannot be withdrawn when the switch is in the "on" position or retained when in the "off" position. The "secret" cover fixing screws cannot be removed without the proper key. A 15-A 600-V socket and plug is supplied in 15-, 30-, 60- and 100-A sizes, and 2-, 3- and 4-pole models. The 60-W flameproof bulkhead fitting has been approved, tested and certified by the Mines Department, as has a 5-A flameproof interlocked switch-plug. There is a 30-A 600-V three-phase interlocked switch-plug, which is also available in 15-, 60- and 100-A sizes, and a 15-A 600-V socket and plug.

Webb's Crystal Glass Co., Ltd.

Among a wide range of "Duro-Ray" British silvered-reflector fittings (illus.) are: No. 20/E for special display work (34s.); floodlight projector No. 100/12a, for 200-W standard lamps or 250-W projector lamps (140s.); spreading pendant No. 8a (28s. 6d., 200-W size, including gallery); and No. 14a unit, with a lead-backed reflector, for the illumination of tall, shallow windows (21s.); natural colour reflectors afford the illumination for which they are designed without the use of screens. The "Duro-Ray" silvering process is one in which the 100 per cent. light reflecting film is permanently protected from the destructive agencies of heat, sea air, moisture, chemical fumes, gases, &c., by an all-metal "backing" which is deposited by a special process.

Welbeck Co.

This cleaner (illus.) is of the canister pattern, without dustbag, belts, revolving brushes or wheels. It consists of a metal dirt container, into which fits a collapsible air filter capable of being folded into a metal housing for withdrawal. On top of the metal container, and of the folding filter, is a B.T.-H. motor. The carpet nozzle consists of a rectangular base of bakelite. Across the centre of the air passage extends another and smaller nozzle normally held free of the carpet by two compression springs; this nozzle has a small brush let into its front edge. The whole is attached to the extension rods by a swivel coupling. A slot, cut at an angle, extends through the rectangular base and directs a jet of air on to the carpet, being of particular assistance in removing surface litter. Special brushes and nozzles are provided.

Westinghouse Brake & Saxby Signal Co., Ltd.

Demonstration apparatus is installed to illustrate the operation through a metal rectifier of a power circuit-breaker; a battery charging emergency lighting equipment; operation of a pair of telewriters from a.c. mains through a metal rectifier; lift control gear showing a rectifier-fed d.c. control panel and a d.c. brake; a multi-circuit battery charger set, showing how banks of batteries may be charged from a.c. mains at their correct charging rate by one set.

Other exhibits are battery eliminators for working telephone and telegraph systems from a.c. supplies without batteries, rectifiers for change-over work and for operating magnetic chucks and clutches and solenoids. The "Westric" car starter battery trickle charger is supplied for the individual use of a car owner for installation in his own garage. This system avoids the necessity of removing the battery, as the charger is plugged into a socket on the dashboard. A complete range of rectifier units for radio high- and low-tension purposes is shown, including the high-frequency type, the "Westector."

An important development of the rectifier which will shortly be available is the new plate type which, it is said, will provide a large current output at a smaller cost than has hitherto been possible; a small experimental model produced during the development stages is illustrated on page 233.

Henry Wiggin & Co., Ltd.

In a model kitchen are shown various electrical domestic appliances employing Wiggin electrical resistance alloys—

The "Servis" wasner (Wilkins & Mitchell)

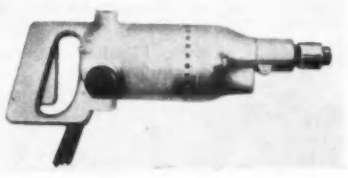
"Brightray," "Glowray" and "Ferry." The equipment includes a hot-water boiler, a cooker, kettle, toaster, iron and a clock. A monel metal sink, one of a range of standardised models which have just been put on the market, is also shown, while other exhibits will illustrate some of the manifold uses of monel metal.

Wilkins & Mitchell

The "Servis" washer (illus.) has a heavy-gauge aluminium tub in a single pressing 22 in. in diameter and 12 in. deep. The agitator is of the three-vane type and the pressed-steel wringer has wide rubber rollers which can be rotated in either direction. Simple eccentric and rack motion mechanism is enclosed in an oil bath, and all the gears are machine cut. The motor is a Crompton-Parkinson ¼-h.p. splash-proof repulsion-induction unit, and transmission is by tough rubber fibre belt.

S. Wolf & Co., Ltd.

A complete range of portable tools includes ½-in. ball-bearing drilling machines for continuous duty with motors suitable for d.c. and single-phase a.c. operation. Type BW4 is fitted with a drill spindle bored No. 1 morse taper socket, and has been produced to meet the requirements of customers preferring to use taper shank drills. Type BW4C is designed for use with straight shank twist drills only.



A "Wolf" portable screw-driving machine

A ball-bearing screwdriving and nut-setting machine for d.c. or single-phase a.c. (illus.) has a reverse plug to enable nuts or screws to be readily withdrawn. It will drive No. 12 wood screws up to three-in. in hard wood.

Exhibitors at Olympia

Aladdin Industries, Ltd.

A new desk lamp (illus.) is chromium-plated throughout and will accommodate any size of lamp bulb. It is 12 in. high and 7.5 in. wide, costs 19s. 8d. and is fitted with a simple adjustable shade for re-

Aladdin chromium-plated desk lamp

flecting a concentrated light in any direction. The base has a new type of switch and is weighted. The range of chromium-plated table lamps consists of about twenty-one designs, all fitted with shades in "Whip-o-lite," a washable and unshrinkable material, including a chromium-plated floor standard priced at 25s. There is a large range of Crown Devon pottery lamps (with shades) from 5s. upwards, and a variety of decorated wooden pedestal lamps and shades, besides over 200 shades ranging in size from 7-in. pendants to 24-in. standard lamp shades.

Belling & Lee, Ltd.

There is a special exhibit of sub-assemblies, laminated bakelite strip work, valve holders, fused and unfused voltage change devices, &c., as well as a full range of radio connections in the form of terminals, wander plugs, plugs and sockets, mains input connectors, fuses and fuse-holders, and four types of gramophone pickups.

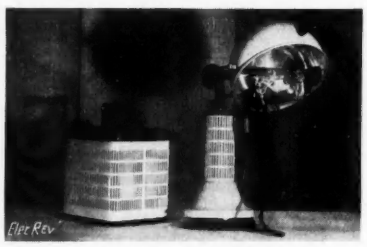
Service engineers will be interested in the display of interference suppressors.

British Broadcasting Corporation

This display is not technical in any way, the object being merely to draw attention to various aspects of the B.B.C.'s activities in connection with Empire broadcasting.

British Hanovia Quartz Lamp Co., Ltd.

The stand has a display of apparatus for ultra-violet radiation. The exhibits are grouped in three sections, corresponding to the use of these rays in



"Homesun" lamp (British Hanovia Quartz Lamp Co., Ltd.)

medical and hospital work, scientific and technical applications, and domestic health lamps.

Striking new developments have been made in the medical lamps since last year's fair, and these are typified in the new "Duo-Therapy" unit. This is a combination giving both ultra-violet and infra-red radiation.

In the scientific apparatus section, some interesting specimens demonstrate the actual employment of ultra-violet rays by users in many branches of industry. The domestic health lamps show the well-known "Homesun" (illus.) in its latest construction and finish.

British Radiophone, Ltd.

This is a display of complete radio chassis; pick-ups with and without volume controls; tuning units comprising high-frequency coils and ganged condensers; disc drives, condensers, tuning coil units, potentiometers; short-wave single tuning and two-gang condensers, quick-make-and-break switches; as well as pressed and turned component parts.

British National Electrics, Ltd.

The display is confined to products of the "Angus" fittings department, consisting mainly of table and floor-lighting standards (illus.). The designs embrace almost any period or style of decoration from Jacobean to 20th-century straight-line and impressionist effects, and the high finish is obtained by the use of good-quality timbers and veneers. The following timbers and finishes are available: burr walnut, butt walnut, solid mahogany, polished oak, light and dark oak stained and limed, pastel shades of blue and green, and blue diamond chromium plate.

A. F. Bulgin & Co., Ltd.

Among the wide range of products displayed by this company are test prods with and without fuses, mains fuse-holders complete with fuses, bulb-type fuseholders, insulated terminals, miniature switches, enclosed fuseholders, dial indicators, lightning switches, knobs, "crocodile" clips, fuse-plugs, twin plug strip with two plugs and a bracket, cartridge fuses and valve-holders.

Thomas De La Rue & Co., Ltd.

An artistic lay-out displays many attractive and intricate mouldings produced during the past twelve months. The wide variety of articles, moulded in synthetic resins, cellulose acetate and bituminous plastics, demonstrates the wide scope of the plastics industry, and coloured mouldings for household use are of particular interest.

Dubilier Condenser Co. (1925), Ltd.

There is a range of moulded mica condensers suitable for all standard uses in radio receivers. The moulding-in after assembly provides perfect sealing and protection from moisture.

Non-inductive tubular types of paper dielectric condensers in various capacities are suitable for a wide range of test voltages. There is also a full range of paper dielectric condensers and condenser blocks for broadcast receiving purposes, as well as an extensive range for commercial purposes, such as, for instance, power-factor correction, neon signs, railway signalling, &c.

Dry electrolytic condensers include metal-cased, tubular, and waxed cardboard carton varieties, the latest in single units and also multiple capacity blocks. Reversible type condensers are a recent introduction.

Metallised resistances in sizes from $\frac{1}{4}$ to 3 W are colour coded according to standard international practice, and there are spark suppressor resistances, suppressor condensers, and filter units for the suppression of interference with radio receivers; and mica condensers for all purposes connected with transmitting apparatus are among the other exhibits. The condensers and resistances generally are suitable for use in tropical climates.

J. J. Eastick & Sons

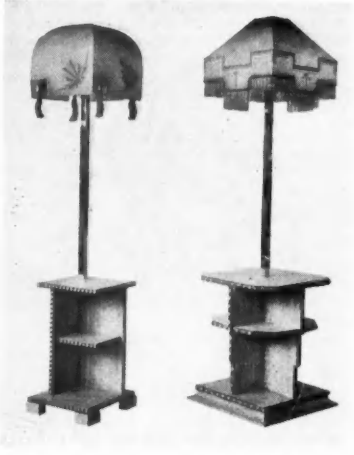
The efficiency and design of the latest "Super" short wave convertor have been improved. The cabinet housing is of highly polished oak, with a panel to match, and the overall dimensions are $14\frac{1}{2}$ in. x $9\frac{1}{2}$ in. x $8\frac{3}{4}$ in. high. On the panel are only three knobs—an "On-off" switch, an illuminated slow motion dial specially designed for short-wave work and having two speeds, the highest ratio being 100-1, and the reaction control. The circuit has been designed to give constant reaction throughout the whole of the tuning scale.

The circuit employs the "Eelex" reversible coil, the design of which has now been improved. A screened grid valve is used as the local oscillator, and a screened grid h.f. pentode valve as combined detector-amplifier. The wavelength range of the standard coil supplied with the unit is 15-55 metres, but by an additional coil this can be increased to 100 metres.

The power supply is obtained from an a.c. mains eliminator equipment built into the convertor, and metal rectification is employed. The price complete is £8 15s.

Electric Art Shades (1928), Ltd.

The new "Electasheen" table lamp (illus.), fitted complete with the shade



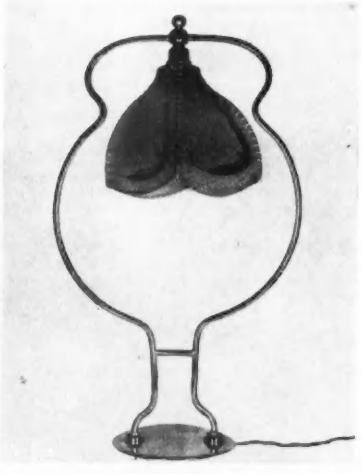
A British National Electric "Angus" floor standard

and fittings, costs 12s. 6d. The base consists of a glass bowl finished in "Electasheen" in a wide assortment of exquisitely blended colours, while the shade is in imitation vellum, hand painted and tinted to match.

A further new table lamp is No. 3577TS, a smart one-piece unit made up in moiré imitation silk with a modern design hand painted. The base and the shade are made all in one piece, the lamp bulb being inserted in the base, thus illuminating the whole table lamp with charming effect. It is fitted ready for use with a bakelite lampholder, torpedo switch and plug, and costs 21s.

Ever Ready Co. (G.B.) & Lissen, Ltd.

Radio receiving sets manufactured by Messrs. Lissen, Ltd., specially for the export trade include the "Skyscraper" models (in both "kit" and assembled form) which have a range covering long, medium, short and ultra-short waves. There are primary dry cells and batteries



An unusual National Lighting Co. fitting

for all types of portable electric lamps, bells, &c.; high-tension dry batteries in standard units of from 60 to 150 V for radio sets; and glass-cell and celluloid and ebonite-cased low-tension accumulators; in addition to all types of portable electric lamps fitted with dry batteries.

General Mouldings Co., Ltd.

This display of plastic mouldings in bakelite, synthetic resin, and fireproof material demonstrates how these materials are used by manufacturers of such articles as vacuum cleaners, house meters, fuse boxes, and in other branches of the electrical industry.

Gillett & Johnston, Ltd.

A small motor-wound turret timepiece (illus.) for outside clocks, with dials up to about 5 ft. in diameter, is time controlled by the usual pendulum and escapement, but in place of the heavy weights falling 30 ft. or 40 ft., a small lead weight wound hourly and weighing about 20 lb. drives an intermediate pinion in the train. This weight, which is automatically wound by a fractional h.p. motor, falls 6 in. each hour. Should the current fail the clock will continue to function for at least two or three hours, the automatic winding being resumed when the current is again available.

The motor drives the winding sprocket through a centrifugal clutch and oil immersed worm gear and the arrangement of the chain and weights is identical in principle with that of the old Huyghens system used in 30-hour farm clocks 200 years ago.

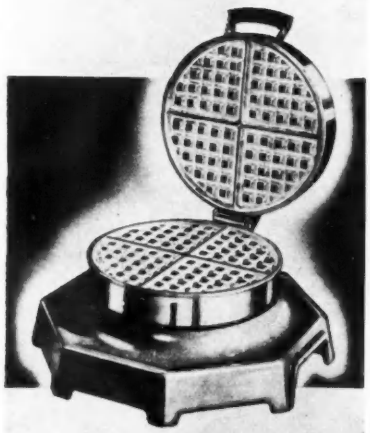
The clock is fitted with the company's mercury release contacts for starting the striking and chiming units. The ¼-h.p. motor, driving through a centrifugal clutch and oil-immersed worm gear, revolves the stack of cams which lift and drop the hammers to chime the quarters.

G. A. Harvey & Co. (London), Ltd.

This range of steel office equipment comprises filing cabinets, cupboards, tables, lockers, shelving, printers' composing room equipment, adjustable and fixed storage bins, &c.

W. T. Henley's Telegraph Works Co., Ltd.

The "Solon" electric waffler (illus.) is made in four colours and for all standard voltages, being specially designed for use on the table. It is guaranteed for twelve months, has a loading of 400 W, and is sold for 32s. 6d., complete with 6 ft. of flex, an adaptor, batter measure, greasing brush, and grid-cleaning brush.



The "Solon" electric waffler (Henley's)

Insulators, Ltd.

Mica and micanite stampings are made for the trade, and this firm is one of the very few which make a point of specialising in mouldings of the bakelite class only. It produces component parts extensively for many of the leading electrical concerns.

Kamm & Co., Ltd.

These talkie cinema projectors and associated sound reproducing equipment are so designed as to enable a single operator to effect a complete change-over of light and sound simultaneously by one movement of the fader. The automatic volume controller, which is incorporated in the amplifying equipment, reduces the amount of attention needed by the outfit.

Kent Mouldings

This company makes a wide range of mouldings for the electrical industry.

K.F.M. Engineering Co., Ltd.

"Internalite" signs are constructed of polished plate glass, on the back of which a design, picture, or lettering may be etched and suitably coloured or gilded. Since the inscription is cut into, and thus protected by, the glass, it is retained permanently and will not discolour. The illumination is furnished by a standard strip-light metal-filament lamp enclosed in a framework along one or more edges of the glass plate. The light passes down through the glass to the etched portions which are thus brilliantly illuminated. These signs are supplied complete with patented lampholders, reflectors, lamps, 5 ft. of flex, and an adaptor ready for use.

David Moseley & Sons, Ltd.

The "Moslite" table lamp standard is made of solid rubber, thus being entirely shock-proof. It is supplied with a polished surface in a series of plain and mottled colours which can be washed with ordinary soap and warm water. The standard is unbreakable and is resilient enough to withstand all ordinary jolts, but is quite rigid enough for ordinary use. The price is 10s. without shade, lampholder or flex, but with a lampholder adaptor moulded into the top of the standard.

National Lighting Co., Ltd.

Modern lampshades suitable for every class of the trade are the feature of this exhibit. The picture lampshades were shown at last year's Fair, but there are many new models, as well as lamp shades made from materials introduced into decorative lighting for the first time, and an extensive range of wood and chromium lamp standards, in addition to other domestic appliances.

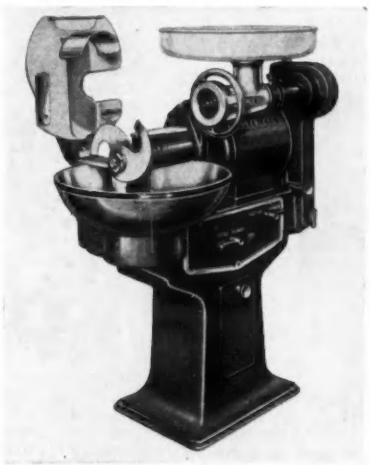
Ozonair, Ltd.

Model plant for theatres, public buildings, offices, &c., consisting of an air filter and washer, cased centrifugal fan, motor, and ozone-producing plant, capable of dealing with 60 cu. ft. of purified air per minute, is to be shown in continuous operation. Each unit of a combined heating and ventilating outfit specially designed for factories and warehouses is capable of dealing with about 600 sq. ft. of floor space and obviates the use of long runs of pipes and numerous radiators.

Type 68 plant is used for ventilating schemes of large volume, while a range of portable apparatus is suitable for purifying the air in offices, stores, living rooms, private houses, &c., and for medical, chemical, and research work. "Ozonair" pure-air plant is used where pure sterile air is required in breweries, food factories, hospital operating theatres, &c.

Peerless Electrical Manufacturing Co., Ltd.

The "B Rotex" dish-washing machine is the first small machine to be constructed in polished "Staybrite" stainless steel, and it is capable of washing and sterilising tableware at the rate of 3,000 pieces per hour. Potato peelers are made in three sizes and handle a batch of potatoes in approximately one minute; they not only wash and peel the potatoes, but automatically discharge them when the door of the machine is opened.



Peerless sausage and mincing machine

This type of machine is made in 14-, 28-, and 56-lb. per minute sizes. Cake mixers and whisks are made in four sizes, 12½, 25, 40 and 80 qts., and are used in the bakery for anything that necessitates mixing. In addition, they are used for purely kitchen work. Each machine is capable of operating such attachments as a meat and food chopper, combined vegetable slicer and bread crumber, &c.

A ½-sack portable electric dough kneader, of original design, is believed to be the only machine in which the mixing arm remains stationary, a great advantage as regards the safety of the operator. A small electric oven can be fitted with either a single or double deck. Its interior measurements are 3 ft. x 3 ft. x 11 in. high, and the full loading of a single deck is only 5 kW. Sausage machinery comprises electric mincers, a sausage filling machine with a variable speed oil pump, and a combination sausage and mincing machine (illus.) built to a practical design.

Radio-Aid, Ltd.

These instruments for assisting deaf people to hear (illus.) depart from standard practice in two main respects.

"Radio-Aid" audiograph

First, thermionic valve amplification is relied upon entirely to impart a quality of reproduction that is not obtainable in any other way. The use of specially designed components and valves keeps the size of the instruments down to modest dimensions. Secondly, aural astigmatism is corrected by the deliberate introduction of distortion into the acoustic output, which compensates the auditory system and thus eliminates strain and fatigue. A specially designed audiometer-testing equipment is also available.

Redferns Rubber Works, Ltd.

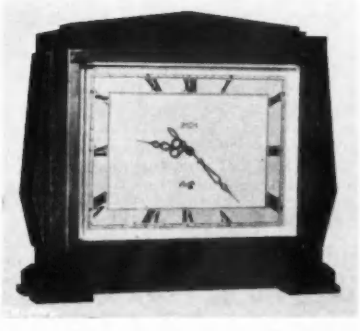
Among this company's principal products are lettered advertising mats, rubber flooring, rubber soles and heels, mechanical rubbers and ebonite goods for industrial purposes.

Smith's English Clocks, Ltd.

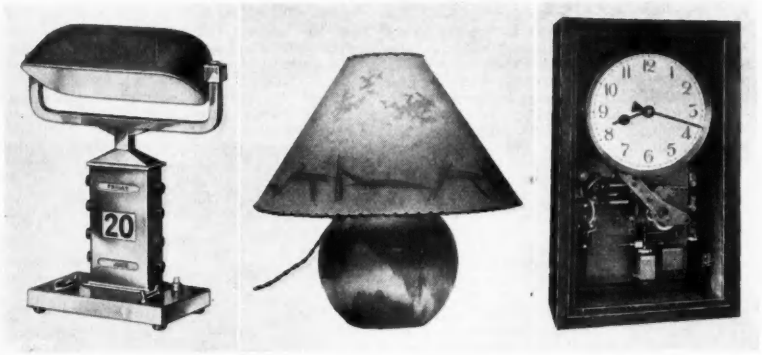
An attractive little boudoir clock is the 30s. "Devon" with a shaped dial and silver raised zone effect, mounted in a bakelite case. Two new striking models are the rectangular "Singapore" (illus.) and the circular 6-in. dial "Sudan," while two new chiming clocks are the "Clyde" and "Conway." The "New York" is a very modern style with chaplets instead of figures.

A new 6-in. dial chromium-plated model has been named the "Dublin" and is primarily intended for use in the kitchen, being fitted with an additional indicating hand to assist in the timing of cooking operations.

There is a grand-daughter clock which retails at 5 gns., while battery clocks listed at 47s. 6d. incorporate a five-



The new Smith's "Singapore" striking clock



A Walker Fendar desk lamp, an Electric Art Shades table lamp and the new T.M.C. master clock

jewelled lever escapement, so that they will work satisfactorily even when not quite level. There is no variation in accuracy when the battery begins to run down, since it is used only to keep the spring wound up.

Streetly Manufacturing Co., Ltd.

These bakelite moulders are exhibiting jointly with their associate, the Beetle Products Co., Ltd., which supplies the raw material in powder, pellet, and granular form to the plastic-moulding trade in a wide range of colours, including white and pale and translucent shades. Moulded bakelite electrical components and fittings, cases, refrigerator parts, &c., are produced.

Telephone Manufacturing Co., Ltd.

An addition to a large range of "Temco" a.c. clocks is a new a.c. master impulse clock (illus.), which is designed to work off time-controlled mains through the medium of a "Temco" movement. It is normally arranged for synchronising slave clocks by means of a fleeting impulse every half-minute. Any number of dials can be incorporated in the circuit, including indoor and outdoor clocks, staff time recorders, and automatic bell ringers for works' shift signals. All the slaves on an installation can be "run up" from the master when necessary, the impulses then being arranged to be emitted every second instead of every half-minute.

Thermega, Ltd.

Apart from electric blankets and pads, electrically heated floor mats (illus.) are available. The 21 in. square size is offered for general use, while there is a 17 in. by 21 in. model specially designed for operation at 6 or 12 V for motor cars. Another item is the large three-heat medical blanket, which is being used extensively in hospitals, where the great advantage of being able to warm a bed quickly and thoroughly is appreciated.

Vince's Dry Batteries, Ltd.

Apart from a full range of batteries for wireless, torches, lamps and eliminators, there is a 45-V heavy-duty h.t. battery with three spring-clip terminals, one at the negative end, one at 22½ V, and one at 45 V. An h.t. eliminator incorporating an l.t. trickle charger is like the standard eliminator suitable for a.c. at 200 to 250 V.

All the goods are specially suitable for the tropics. The torch cells have sealing caps impervious to climatic conditions, and the h.t. batteries are notable for low internal resistance.

Vulcanised Fibre, Ltd.

A comprehensive range of electrical and motor component parts includes tubes, rods, conduit lids, cartridge fuses, rings, washers, telephone plugs, suction cleaner parts, and sheet. The company claims for its products high insulation value and mechanical strength, superfine ground finish and machining to the finest limits.

Walker Fender Co., Ltd.

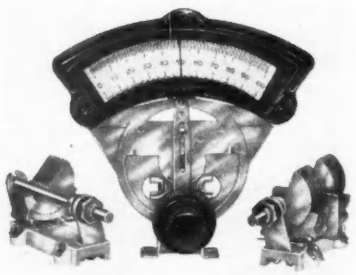
Metal floor and table lighting standards are an outstanding feature of this exhibit. There are new electric clock lamps, including 8- and 30-hour models, and a new desk lamp (illus.), as well as a novel reading lamp. There are also an adjustable bridge lamp and floor standards for indirect lighting.

Watmel Wireless Co., Ltd.

A range of twenty-six models of volume controls includes a new wire-wound screened model for manufacturers and also a heavy-duty type of volume control for television, laboratory and electro-medical purposes. In addition to these, the company's range of "Hywatt" fixed resistances is displayed.

Wingrove & Rogers, Ltd.

In addition to ranges of standard radio condensers and pointer and disc drives, including full vision drives and short wave condensers, there is a new slow-motion drive suitable for short wave sets. This "Micro Drive Arcuate" or "Micro Drive Horizontal" has ratios of 100 : 1



Wingrove and Rogers condensers

and 7 : 1, and is controlled by two knobs on the front of the panel. The panel appearance, with the exception of the knobs, is similar to that of the horizontal, arcuate, semi-circular and moving scale drives, but the scale is 0-100 in the case of the horizontal and arcuate drives and 0-130 for the semi-circular and moving-scale drives.

New Books

Electricity. By JOHN PILLEY. Pp. 348; illus. Oxford University Press. Price 7s. 6d.

This book is not intended as a text-book, and its primary purpose is not to impart knowledge of the kind usually demanded in examinations. We congratulate the author on his courage in throwing the traditional methods of presenting the subject of elementary electricity completely overboard and approaching it from the point of view of modern theory.

The treatment is such as to give a pleasant effect of continuity, which is made possible by the free use of very full footnotes throughout the book. In general, mathematics is avoided, and therefore some part of the work is necessarily somewhat vague and inconclusive. The book opens with the question: "What is Electricity?" and the second chapter concerns itself with the electrical structure of matter. Then comes electrification, electrical potential, electrical induction and capacity, the electric field, forms of electric discharge, creation of electrification, electrolytic potentials, and the electric current.

The author approaches magnetism (we believe rightly) from electromagnetism, dealing with magnetic substances in the following chapter, which is followed by electromagnetic induction. The last three chapters are on oscillatory currents, oscillatory circuits and, finally, radiations from atoms. The general scheme of this method of treatment—unusual in an elementary book—is to deal first with electricity as an entity, then electricity at rest, electricity in motion and, finally, electricity in oscillation. It is difficult to say how far such a logical arrangement of the subject can be successfully appreciated by an electrical engineering student just beginning his studies, but with a background of previous study, particularly of physics and chemistry, he can read the book with much advantage, interest and appreciation.

There are some minor points calling for criticism, particularly where the author enters the realm of engineering applications. For instance, the use of the word "pole" when dealing with the dynamo is not in accordance with engineering practice; evidently each *section* of the armature winding corresponds to two of the author's "poles." Fig. 129 shows a two-pole motor with two sections to the armature connected to a four-part commutator, and the figures on page 259 evidently refer to the e.m.f. curves with 1, 2 and 4 sections to the armature revolving in a two-pole field. Again, the motor-generator is referred to as a rotary convertor, and some caution as to power factor should qualify the statements as to the input and output of a transformer on pages 270-271.

Classified Examples in Electrical Engineering. Vol. II: Alternating Current. Third Edition. By S. G. MONK. Pp. 132. London: Sir Isaac Pitman & Sons. Price 3s. 6d.

This useful little book has now reached its third edition, the first edition having appeared in 1928. Sundry corrections have been made, certain questions have been deleted, and new ones included. The additions consist largely in bringing up to date the questions taken mainly from the London B.Sc.. (Eng.) degree, the I.E.E., and the final City and Guilds papers, including some set as late as 1933. As the bulk of the questions are taken from these three sources, candidates for these examinations need scarcely trouble about copies of earlier papers, for they will be well armed with Mr. Monk's book.

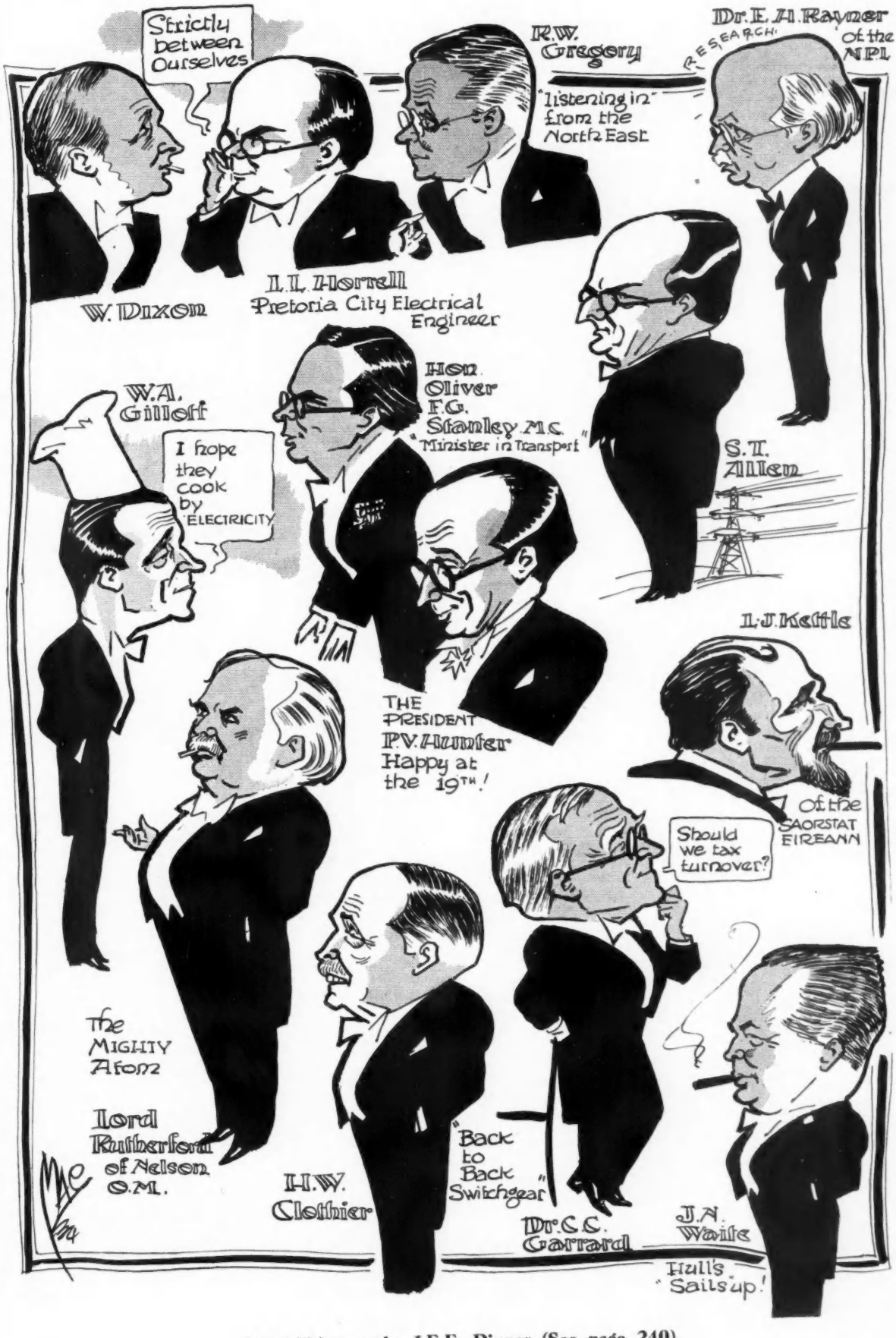
* * *

Shorter Notices

In this year's "Practical Electrician's Pocket Book" (Odhams, 2s. 6d.) a new system of classification is introduced. Subjects of a similar nature are grouped so that there are now seven main sections, each providing a complete study of one particular branch of electrical application. There are other major changes in the new edition. Mr. A. P. M. Fleming sums up the technical developments of the past year.

We have received the 1934-5 "Engineering Directory and Buyers' Guide" published by *The Engineer*, which includes an index and technical vocabulary in French, German, Italian and Spanish, and a list of British Standard Specifications and reports.

The National Employers' Mutual General Insurance Association, Ltd., 10, St. Mary Axe, E.C.3, has brought out a 200-page booklet, "The prevention of accidents in the building and allied trades," and the treatment of minor injuries, one chapter being devoted to electrical work. Copies may be obtained gratis from the Association.



Notabilities at the I.E.E. Dinner **(See page 240)**

The I.E.E. Dinner and Electrical Engineers' Ball

THE electrical social season may be said to reach its zenith towards the middle of February each year with the annual dinner of the Institution of Electrical Engineers and the Electrical Engineers' Ball held this year on Thursday and Friday last week.

The dinner was on the ice rink at Grosvenor House, Park Lane, W., when nearly 800 members and their guests were received by the President, Mr. P. V. Hunter, C.B.E. This is a much bigger number than ever before, last year's record total being passed by over a hundred. The accommodation was ample, but we are told that those with seats remote from the top table had some difficulty in hearing the speeches distinctly.

In the absence of Sir H. Kingsley Wood (Postmaster-General), the toast of "The Institution of Electrical Engineers" was proposed by the Hon. Oliver F. G. Stanley, M.C. (Minister of Transport), who introduced himself as having been connected with electricity in the past as a director of the Southern Railway, whose enterprise in electrifying its lines had been so well rewarded. He believed that the new extensions would be equally successful.

The past year had been one of great progress in the electrical world as shown by the output of 13¼ thousand million kWh by authorised undertakings—an increase of over 10 per cent. on 1932. One undertaking, the London Power Co., had generated 5,600,000 kWh in twenty-four hours. The grid had been completed and the technical skill with which it had been constructed was above criticism; it had raised the prestige of British engineers all over the world. In spite of fluctuating prices, its cost had been within 2½ per cent. of the estimate of £27 million, and 97 per cent. of the wayleaves had been obtained by consent. Engineers were not to blame for the present state of affairs, which was due to the lack of intelligence and courage of the public in its use of the gifts of science.

The President, responding, said that had the Postmaster-General been present he would have expressed to him the appreciation of the Institution of his step in giving engineers of the Post Office opportunities to rise to the highest administrative posts. His appointment of a public relations officer had also been a manifest success. Mr. Hunter referred to the unwearying services of Mr. P. F. Rowell and his staff, and congratulated Messrs. A. E. Rayner and F. W. Hewitt on their well-merited appointment as assistant secretaries.

Distinguished Guests

Lt.-Col. K. Edgcumbe proposed the health of the guests in a characteristic speech. Apart from those who spoke, these included: Sir John Brooke (vice-chairman, Electricity Commission), Mr. A. E. L. Chorlton, M.P. (president, I.Mech.E.), Messrs. E. M. Dence (chairman, L.C.C.), J. W. Dulanty (High Commissioner, I.F.S.), Dr. S. F. Dorey (Lloyd's Register of Shipping), Dr. J. T. Dunn (pres., Soc. Chem. Industry), Mr. E. J. Elford (chairman, B.S.I.), Lord Eltisley, Messrs. G. W. Gray (pres., Inst. of Mining and Metallurgy), W. G. Hislop (pres., C.I.S.), F. Hodges (C.E.B.), Sir C. W. Hurcomb (Secretary, Ministry of Transport), Sir Thos. Inskip (Attorney-General), Prof. P. Langevin (pres., Société Française des Electriciens), Sir W. J. Larke (pres., Inst. Fuel), Col. Sir H. G. Lyons (pres., Inst. Physics), Prof. G. T. Morgan (pres., Chem. Soc.), Brig.-Gen. M. Mowat (sec., Inst. Mech.E.), Sir Joseph E. Petavel (director, N.P.L.), Mr. M. J. Railing (chairman, B.E.A.M.A.), Prof. A. O. Rankine (pres., Phys. Soc.), Mr. F. G. Rudler (Mayor of Westminster), Sir F. E. Smith (sec to Council, Dept. S. & I. Research, and sec. R.S.), Lord Stonehaven (pres., Inst. Naval Architects), Mr. C. W. Sully (pres., I.E.S.), Col. S. F. Turner (Director of Works and Buildings, Air Ministry), Prof. S. Wallot (Electrotechnische Verein), Mr. M. E. Webb (vice-pres. R.I.B.A.).

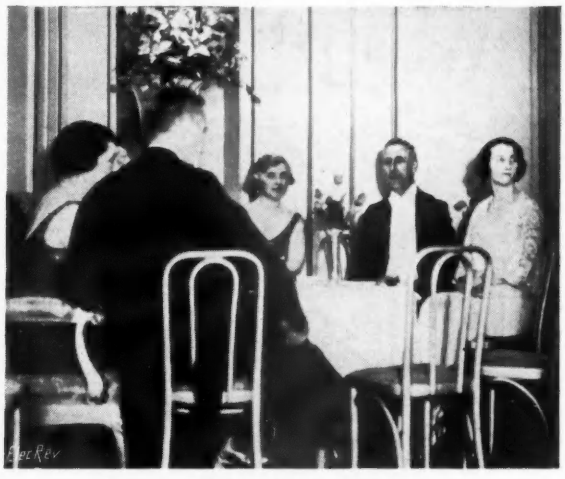
Members at the top table were Mr. Ll. B. Atkinson, Sir Wm. Bragg, Col. R. E. B. Crompton, Capt. J. M. Donaldson, Dr. C. V. Drysdale, Dr. P. Dunsheath, Lord Falmouth, Messrs. A. P. M. Fleming, J. M. Kennedy, Lt.-Col. A. G. Lee, Messrs. C. D. le Maistre and W. M. Mordey, Sir A. Page, Messrs. C. C. Paterson, F. W. Purse, Col. Sir T. F. Purves, Dr. E. H. Rayner, Mr. P. Rosling, Dr. A. Russell, Messrs. A. M. Sillar, R. T. Smith and C. P. Sparks.

To return to the speeches, the Rt. Hon. Lord Rutherford of Nelson, O.M., replied on behalf of the guests, recalling his war-time association with the President and revealing that Mr. Hunter's interests were not solely technical. Research, he said, lay at the back of developments for the future, and short work should be made of any suggestions to remove research laboratories from this country. Interest in electricity was not confined to the electrical profession; it extended to all physicists. All matter was a form of electricity. Evidence was forthcoming from French sources that aluminium when bombarded by α particles would emit positive electrons, now known to play a part in the constitution of matter.

The dinner was followed by the usual reunion which is always a real reunion as it provides one of the few opportunities in the year for the forgathering of old friends and former colleagues now scattered in different parts of the country.

The Ball

The spirit was kept up the following evening at the Electrical Engineers' Ball, also held at Grosvenor House. A large number took part (over 800 were present—another record broken) and there was a delightfully informal air about the whole evening.



A party at the Electrical Engineers' Ball

The E.R.A. Luncheon

THE annual luncheon of the British Electrical & Allied Industries Research Association took place at the Savoy Hotel on February 9th. Following the loyal toast, Mr. P. V. Hunter, president I.E.E., proposed "The Association," remarking that he could speak from personal experience on the inestimable value of the work it was doing. Although he had at times been somewhat critical, questioning the need for some sections of the work, when the particular investigation was completed he had fully appreciated the necessity for it. Some people could not be made to believe that their own branches needed investigation. He feared that Mr. E. B. Wedmore would remain wedded to financial trouble so long as he remained a director.

Sir Hugo Hirst, Bt., president, in reply, spoke of the reasons which caused him to establish a research organisation. Although they possessed the best engineers, designers, and works, something occasionally went wrong with the product. Then at the end of the war England began to fall behind, and was satisfied to do as well as others. Against those conditions he rebelled, and he determined to have a laboratory which would put an end to dependence upon the foreigner and enable them to look their competitors in the face. He was proud of the achievements of that laboratory. Often he was asked whether it paid; his reply was "not in accountant's figures," but it created prestige, which bred confidence, which brought business.

When he was appointed to serve on the committee which was set up to inquire into the research work that was being done with the aid of the Million Fund which the Government had set aside for that purpose, he found that E.R.A. loomed very largely in the picture. Some of the older industries, however, which had no sympathy with, or understanding of, research did not seem to know what to do with new discoveries due to research. But a change was taking place, for the younger, more cultured, more scientifically minded staffs that were now being accumulated would progress differently.

Sooner or later saturation must occur in the home market. It became necessary, therefore, to increase exports, and by means of research and invention to cater for the requirements of differing communities.

Mr. C. P. Sparks (chairman-elect), in proposing the health of the chairman, reminded those present that no industrialist had done more than Sir Hugo Hirst to emphasise the importance of, and necessity for, research. E.R.A. now spent £50,000 a year, but if that sum were doubled it would still be far too small.

MEETINGS AND DISCUSSIONS

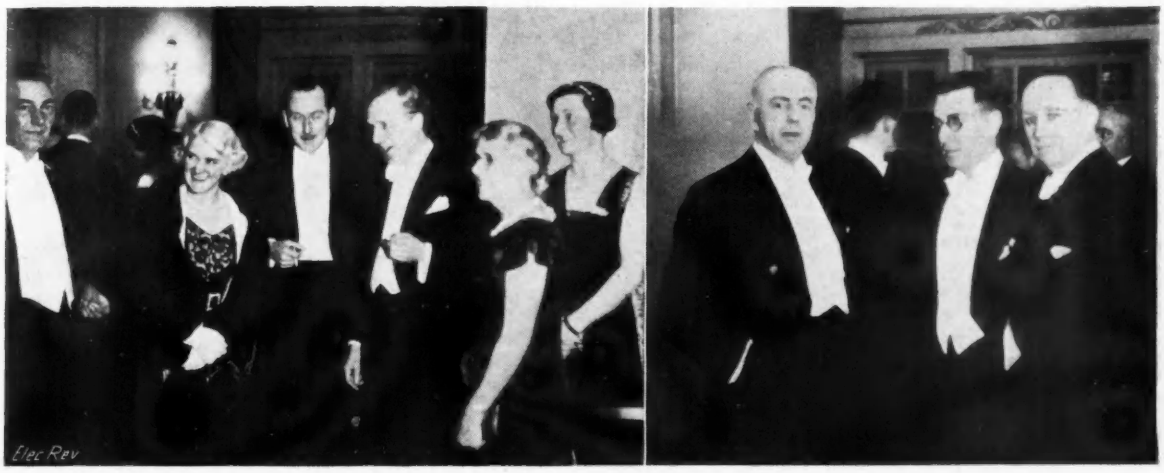
Current Topics and Opinions Expressed at the Institutions

Grid-controlled Rectifiers

THE future trend of grid-controlled rectifiers was the subject discussed at the February 5th informal meeting of the INSTITUTION OF ELECTRICAL ENGINEERS in London. Mr. J. E. Calverley described the apparatus and method of biasing the control grid, remarking that a true valve action resulted. Applications already in service included phase conversion and frequency changing applied to railway traction work; for regeneration, the machines were paralleled with rotaries in large rolling mills, &c. A wide range of voltage control and ultra-rapid suppression of short circuit and reverse voltage was claimed for the grid function, while research was proceeding in the endeavour to improve efficiency at low voltage and to produce apparatus that would withstand extra high reverse voltages.

Mr. W. E. Highfield said that the new rectifier must mean that the older methods of conversion would be scrutinised more closely. A far more versatile rival to the motor-convertor, the Ward-Leonard set, and the synchronous motor-generator had appeared.

Mr. E. S. Ritter feared that many harmonics would be developed and, as a telephone engineer, this possibility gave him some concern. The thermionic valve started with one grid, but was gradually accumulating more, and it looked as if the rectifier would follow this procedure. Mr. J. F. Shipley said that there was undoubtedly a great and legitimate field for the new rectifier, but the mistake of crushing the new idea by calling upon it to do too much must be avoided at all costs.



Some of the guests at last Friday's Electrical Engineers' Ball at Grosvenor House

The Benson Boiler and Power Station Design

THE possible influence of the Benson type of steam producer on the development of power stations is discussed in the paper by Mr. F. Ohlmüller which was read in London on February 15th at a joint meeting of the INSTITUTION OF ELECTRICAL ENGINEERS and the INSTITUTE OF FUEL.

Besides working at the critical pressure, the Benson boiler can be operated with a variable pressure, within limits. The general layout and arrangement of tubes can be based entirely on structural requirements and the method of firing preferred. A considerable saving of cost and weight results from the omission of drums and forced flow enables much smaller tubes to be used than are needed for natural circulation. In the Benson boilers hitherto built tubes of 20 to 30 mm. bore are used.

For very small outputs the boiler may be formed of a single tube, but for commercial sizes subdivision is indispensable. The number of tubes connected in parallel, and the velocity of flow resulting therefrom, can, however, be chosen freely.

The general construction will in many cases resemble that of a normal boiler, but a special design has been adopted in a few cases for erection in the open, thus reducing the boiler house cost. According to the space available, Benson boilers may be of the single-pass type of great height and occupying small floor area, or of the two- or three-pass types, which are lower but of greater length and breadth.

Method of Construction

Simple standard designs have been developed for the essential parts. Those forming the heating surface are grouped to form normal elements, which are differently designed according to whether they are intended for the radiation or convection parts of the boiler. The elements for the radiation part consist either of coiled or of straight vertical tubes with headers at the lower end and collectors at the upper end, and of down-tubes leading to the next element. The elements of the convection part consist of separate coils wound clockwise and counter-clockwise, which together form heating elements when inserted into one another. These are provided with supports at the return bends and are built into the boiler as a whole.

Originally tube overheating was experienced in the zone where evaporation ceases and superheating begins. It was caused by precipitation of salts contained in the feed water, due to the water-steam conversion zone being in the region of maximum radiation. The remedy was the removal of the affected parts of the heating surface to a region of lower flue-gas temperature.

As regards operation, for base-load plant and when fuel costs are high the critical pressure (highest) will be chosen for maximum economy, but for small plant and peak-load stations the author suggests that it is preferable to operate at sub-critical pressure according to the method of Messrs. Siemens-Schuckert and the Internationale Benson-Patentverwertungs A.G. This consists in omitting any throttling of the steam between the boiler and turbine, irrespective of the load. In this way the Benson boiler always delivers steam at the most economical pressure consistent with the load at which the turbine happens to be operating.

Sub-critical Operation

The condition to be fulfilled is that with varying load the distribution of heat in the various sections of the heating surface of the boiler should be such as to ensure that at all loads those parts of the heating surface subject to deposition of salt remain in the desired region of flow of the flue gases. The possibility of operation at varying pressure can be utilised to particular advantage in power stations operating with fluctuating loads, especially where considerable peaks have to be met. In such cases the turbine is designed to take the most frequently occurring base-load at the lowest economical pressure and, when the peak loads come on, the steam pressure is correspondingly raised so that the weight of the steam passing through the turbine is similarly increased: thus the volume of steam passing through the turbine remains practically constant, since at constant inlet temperature the specific volume is approximately inversely proportional to the pressure.

Of course it would not be possible to utilise fully the available vacuum in the last stages of the turbine. If, however, the condensing plant is liberally designed, then the power developed in the last stages will remain approximately the same, although the vacuum will be somewhat reduced. Both the adiabatic and the useful heat-drop remain approximately

L

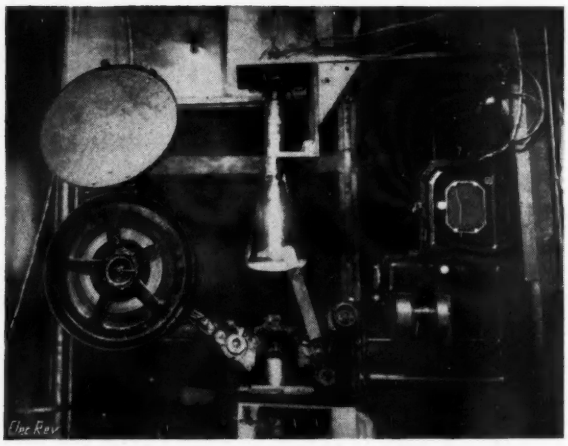
constant at all loads. Since the total volume is also constant and the Parsons factor of the machine remains practically unchanged, it follows that the thermodynamic efficiency of the machine, and consequently its specific steam consumption, must be constant at all loads. Governor valves are not necessary for the turbine if it operates in parallel with other machines; overload valves are also superfluous. All that is required is a stop valve, designed for rapid closing, which can be used for throttling in emergencies.

The advantages and possibilities of this new development may be summarised as follows:—

(1) Condensing base-load stations, back-pressure plants, and bleeder plants, with but slightly varying loads, as well as merchant ships, will be designed for operation with constant pressure, the value of which can be chosen with a view to low costs and high thermal efficiency, the upper limit of the pressure being the critical pressure. (2) Stationary plants with widely variable load (peak-load stations), warships, and locomotives, will be operated at pressures varying with the load, by which means a simple and inexpensive turbine and an approximately constant thermal efficiency at all loads are obtained. (3) Generating stations, industrial plants delivering steam for power process-work, and thermal stations, can be readily designed from the outset with suitable boiler tube thickness, so that a future increase in output may be obtained later by raising the pressure according to the larger quantity of steam to be passed through the turbine, the turbine and piping being adapted to the new conditions at small expense.

The Electric Driving of Ships

TURBO-ELECTRIC ship propulsion is dealt with at some length, and in simple non-technical language for the benefit of those not very familiar with the subject, in the paper by Mr. C. W. Saunders which was read before the INSTITUTE OF MARINE ENGINEERS in London on February 13th.



This is a part of the Cossor cathode-ray television apparatus demonstrated at the Institution of Electrical Engineers last week by Messrs. L. H. Bedford and O. S Puckle

The machinery and electrical circuits are described and their functions explained, detailed considerations peculiar to turbo-electric propulsion are summarised, and finally information is given concerning faults and failures experienced, together with comparisons between twin and quadruple-screw vessels up to 200,000 s.h.p.

The author stresses the fact that a breakdown cannot as a rule cripple the ship. Even a major overhaul of a rotor (short of a complete burn-out, which is unknown) occupies less than thirty-six hours with the necessary gear, or a little longer by the ship's staff with improvised gear, but in either case the ship can still maintain three-quarter speed from the rest of the machinery, which is not prejudiced or injured in any way. Electrical faults are never general throughout, or adversely affect the rest of the gear, but are practically always local and can be repaired *in situ* and wherever the ship may be.

Difficulties in design are experienced by reason of the control gear for four shafts and two engines being all in one cubicle, with numerous cross-running arrangements. Main circuits have been broken deliberately on manœuvring and on full power, at sea, with the 3,000-V maintained, which means the worst possible condition, and no damage whatsoever resulted. This should go a long way to convince shipowners and marine engineers that with turbo-electric propulsion any choice of revolutions, number of shafts, and number of engines is available.

Breakdowns on the electrical side are within the scope of the ship's staff for repairs at sea, and there is always the further advantage that if the fault is not in a motor all propellers are available at approximately half power for getting to port, or while repairs are effected; whereas with any other form of drive anything that happens on one side of the ship puts that propeller out of action for a fairly long period, demanding helm all the time.

Electricity in Town Planning

THE influences which electricity exercises on town and country planning was the subject of an address by Mr. O. A. Sherrard, deputy secretary of the Central Electricity Board, to the TOWN PLANNING INSTITUTE in London on February 9th.

In outlook the C.E.B. is national at one end and local at the other, while it functions regionally. As the wholesale supplier to the distributors it must take local possibilities and needs into account. Its pattern is unique in the annals of this country and the precedent created is, Mr. Sherrard thinks, likely to be followed. This has a bearing on town planning, which is itself becoming regional and in some directions perhaps even national. The C.E.B. had to deal with an established industry, so its method had to be curative rather than creative, otherwise the grid would have assumed a different shape. As it is the first task has been similar to that of a town planner, namely, to improve existing conditions.

Side by side with the flux and flow of industry domestic interest has been awakened. At the end of 1933 about 45 per cent. of the premises in Great Britain were taking supplies of electricity, as compared with 23 per cent. in 1927, and the power demand is once again increasing at the rate of about 10 per cent. per annum. The grid is not static, but alive, and its growth is stimulating the establishment of factories and industries in new districts.

Were these facts taken into account in town planning schemes? The grid was a river of power, capable of not only irrigating the lands, through which it passed, but also of overflowing its banks, finding its way into new channels, and creating numberless fresh streams and rivulets. So far it had been bound to follow the old original channels, but it had no intention of confining itself to those limits for a moment longer than necessary. The grid should be the backbone and framework of all future town planning.

Electrical Mining Equipment

THE electrical layout for mechanised coal winning was the subject of a paper by Mr. H. Taylor which was read before the London Branch of the ASSOCIATION OF MINING ELECTRICAL ENGINEERS on February 6th.

In the subsequent discussion Mr. H. M. Morgans (past president of the branch) said that the value of switchgear for small motors of 3 h.p. downwards such as were used on drills would be about twenty times the value of the motor, and it would be very expensive to protect the motor in the same manner as other gear. Presumably fuses would not be very satisfactory since they ought to run practically red hot if they were to give proper protection. But if the drill were driven *via* a transformer one had a chance of providing protection. In reply the author said that for small drilling machines fed by a small transformer thermal trips gave quite suitable protection. Where there was a big transformer thermal trips were liable to burn out completely or to take up a permanent set.

The gauze between the well glass and the bulb of special lamps for road gate and coal face lighting was of 12 mesh. It certainly reduced the standard of light, but the efficiency of the lamp was a minor consideration when lighting from the mains.

In reply to Mr. C. E. Luxton, the author considered that it would be going a little too far to provide a pilot cable right back to the panel on the low-voltage side of a transformer, since flit plugs were bolted, and nuts could be provided to prevent unauthorised interference.

Mr. G. M. Harvey (past president) said, with regard to pilot control for gate conveyors in tandem, the cable was bound to be small, and would be the vulnerable point in the system. The correct thing to use between a conveyor panel and the conveyor itself was a five-core screened flexible trailing cable. The author said he had not experienced trouble with the small cable used for sequence control. Most colliery electrical engineers recognised that it was essential to have earth leakage protection.

Mr. J. Parker, referring to the ionisation of air inside an enclosed contactor casing, said it was his experience that repeated operations of a contactor in a confined space led to

flashover, but the author replied that he had not experienced such a difficulty. Nitric acid was frequently formed which attacked the contacts; that was why remote control gear demanded better maintenance than oil-immersed or air-break direct-operated gear.

Mr. S. A. Flax, while not going so far as to suggest that there should be no interlock at all, felt that it should not be stressed too much. If they were to insist that the contactors and protective devices in drill panels should be on separate bases they would have a multitude of small pieces of apparatus. With lamps of lower voltage than 110 there was more chance of the ignition of firedamp by the hot filament after a lamp was shattered as the thicker filament took longer to cool. He did not consider that there was much danger in using 125-V lamps. Lower voltages for coal face lighting would mean a complexity of apparatus which was not really worth while.

Mr. Taylor said that the reason for putting parts on separate bases was to allow of easy removal of any part and the refitting of a similar part into exactly the same position. To provide keyways was to destroy what had been aimed at for so long—the British standard plug. Any lamp taking less than 1 A would cool off quickly enough in the event of breakage, provided the circuit to the filament was disconnected instantly. Eventually coal face or gate end lighting would stand or fall on the number of lamp breakages. It was less complicated to fit gauze than a relay.

The younger men now operating the cutters and conveyors were rather more mechanically minded than their predecessors, and, therefore, there was less difficulty in getting complicated equipment operated in the pits.

This illustration of the Dovercourt promenade displays a "Revo" lighting installation of pleasing appearance and with efficient illuminating features. It consists of cast-iron standards with decorative brackets and lanterns giving a mounting height of 21 ft. to filament, with subsidiary pilot lighting units for reduced all-night lighting purposes

Regenerative Braking on Road and Rail

REGENERATION as applied to d.c. electric traction is the subject of a lengthy paper by Mr. G. F. Sinclair which was read before the INSTITUTE OF TRANSPORT in London on February 12th.

For both railway and road service the value of this method does not lie in its substitution for friction brakes, but only as an economical addition thereto, which suggests that the addition of a motor generator or dynamotor in a street vehicle is a great disadvantage both from the point of view of weight and maintenance, and recent developments have tended towards the use of a compound wound motor for regenerative purposes. Compared with a series machine it is heavier for a given output when driving, but it compares advantageously in weight with a system using a dynamotor or other method of separate excitation.

On trolley-buses the present practice is to use a single motor and considerable saving in energy consumption has been made by designing this motor with a large range of field control following a practice which has been common on railways for many years. This augmented field motor, called regulated or supersaturated field, is economical when used for trolley buses with a single motor, but the saving in energy consumption is not so apparent with series-parallel control with two motors. The characteristics of this type of series motor have been embodied in a compound wound motor which, under certain operating conditions, shows appreciable savings in current consumption over the augmented field motor and, of course, still more over the straight series motor.

While at the present moment the compound wound motor appears to be preferred for street electric traction when regenerative control is desired, on railway work, where motors are of much larger capacity, the series motor is still predominant. The latest d.c. electrifications on which regeneration has been used have employed the normal series motors with their field separately excited from a variable voltage generator, driven electrically or mechanically.

* * *

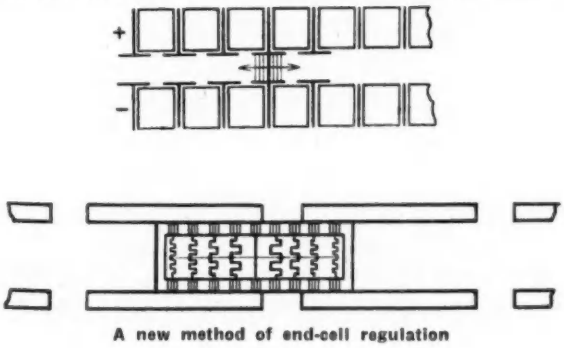
Electrical Equipment for Cranes

The luffing, slewing, hoisting, and travelling motions of dockside jib cranes are discussed in the paper by Mr. R. V. Powditch, which was read before the London Students' Section of the INSTITUTION OF ELECTRICAL ENGINEERS on February 9th. High light rope speed is a desirable feature for speedy operation. Preferably this is obtained electrically, by the use of a "load discriminator," which cuts out a part of the series field of the motor when the current falls to a predetermined value. Types of motors are discussed, with particular reference to the d.c. series machine. Magnetic brakes are a useful safeguard in the event of failure. Centrifugal brakes are also used to give a constant lowering speed and an overspeed safety device. Rheostatic and regenerative braking are compared, and the advantages offered by dynamic and potentiometer braking described. Contactor control systems are considered the most suitable for reliable operation.

End-cell Regulation

IN order to eliminate the cost of cables between the regulating end cells of lighting batteries and the usual type of separately mounted regulating switch, the Stuttgart Electricity Works has adopted a method of mounting suitable contacts close against the cells concerned. The first trial of the new system was made on a battery of 120 small cells for emergency lighting and switch operation in the Kniebisstrasse sub-station.

In this installation the usual double-cell switch is replaced by hand-operated contact slides between two bare horizontal conductors (running to the switchboard) and a contact bar or rail connected directly to the connecting strips of the cells, this rail being interrupted between cells by insulating pieces. The contact slides are fitted with transition resistances as usual.



A new method of end-cell regulation

The satisfactory performance of this equipment led to the use of a similar arrangement in the Stöckach sub-station, where there is a 136-cell, 1,008-A (3-hr. rate) battery connected to a 110/220-V three-wire network. In order to provide for future operation at 220/440 V each side of the battery is fitted with fourteen end cells.

The accompanying illustrations, from a paper by W. Hollatz in *Elektrotechnische Zeitschrift*, show the use of a sliding contact bridging the gangway between two rows of cells and making contact with copper rails connected to the cell-connectors by edge-mounted copper strips. The sliding contact puts cells in or out of circuit, as the case may be, two at a time, and is thus equivalent to a simple cell switch with two cells between contacts; no connecting cables or leads of any kind are required other than the short strips to the contacts.

As shown diagrammatically in the lower illustration, the contact slide carries a number of electrically independent pairs of contact brushes. The centre pair is short-circuited, and each of the other pairs, from the centre outwards, is connected by a higher resistance; this arrangement of transitional resistances prevents interruption of circuit or appreciable sparking, whichever the direction of switching. Single-coil switching can be arranged on the same principle if desired. The copper connecting strips are lead-sheathed to prevent corrosion, and the contact surfaces are kept well greased.

Five other batteries in Stuttgart, including two in schools, have been fitted with direct-mounted switching equipment of this type. The cost is said to be about half that of the usual end-cell switching apparatus.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Admission to the Fair

As misunderstanding seems to have arisen about the admission charge for buyers visiting the forthcoming British Industries Fair, I should be exceedingly grateful if you would permit me to explain the position.

It is not the fact that buyers will require to pay 2s. upon each occasion they visit the Fair. The arrangement is that upon making one payment of 2s. buyers will receive a badge

This novel tramcar has recently made its appearance in Blackpool. It is a double-ended central-entrance vehicle designed for sight-seeing passengers.

entitling them to attend as frequently as they wish during the entire period of the Fair, *i.e.*, from February 19th to March 2nd. The one badge will give admission equally to the London and Birmingham Sections without further payment of any kind. I think it will be agreed that the charge is moderate. Certainly it compares favourably with that made for admission to the leading Continental trade fairs.

Members of the general public will be admitted to the Birmingham Section daily upon payment of 2s. On Saturday, February 24th, a reduced charge of 1s. will be made for members of works parties. C. E. GREENER,

Chairman,

B.I.F. Management Committee, Birmingham.

Birmingham, *February 8th*.

A Fatality at Armagh

I note in the Correspondence columns of your February 9th issue a letter from the chief engineer of the Northern Ireland Electricity Board correcting your report of the above accident, from which I gather that the line in question was a two-wire service line at 230 V above earth. I have read a report of the inquest on the two boys, and am moved to inquire as to how this particular line was protected, and how it came about that a short-circuit that was sufficiently severe to actually fuse the wire in halves failed to cause the immediate isolation of the line.

Many engineers are of the opinion that the present methods of protecting overhead lines are hopelessly inefficient. It is certain that if a fault of this nature cannot, from any cause, render the line dead, then it is quite hopeless to expect that a falling line can be rendered dead by reason of an earth contact without short-circuit. The possibilities of such a line falling on iron farm buildings can be better imagined than described, and although insulated wires are used in many cases in this country yet even this cannot render them harmless under such circumstances.

It is easy to speak of malicious persons throwing a wire over the conductors, but is there not a responsibility upon someone to see that adequate precautions are taken against such happenings? T. C. GILBERT.

Folkestone, *February 10th*.

Engineers and Economics

As a result of the announcement in your issue of January 19th I attended one of the fortnightly meetings of the Engineers' Study Circle on Economics on February 6th, and found a small gathering of engineers and scientific workers who are earnestly taking upon themselves the task of analysing the existing social and economic system with the determined view of ascertaining by scientific methods the reason for its observed failure to "deliver the goods."

Some of us are already convinced as to both the existence of chronic under-consumption and the reason for its existence, but as the group consists of engineers of different shades of economic and political opinion it should be possible collectively to take a dispassionate and unbiased view on the evidence which is being collected by the various sub-sections, on which the group as a whole will finally report.

In these days when not a few of our profession are enjoying compulsory and unpaid leisure, and the rest of us gain our living largely by helping to displace others, it seems highly important that this group of trained technicians with no axe to grind should acquire a numerical strength necessary to evolve from their investigations a revision of the economic system, which will enable us to consume the goods which are at present produced in such great abundance—a task in which, either by design or from incompetence, the professional economists have so signally failed. B. WOOD, M.A. (Cantab).

London, W.1, *February 8th*.

Electrical Engineers—and Others

I would point out to "A.M.I.E.E., Assoc.A.I.E.E." that although some people who are not "chartered electrical engineers" call themselves "electrical engineers" they may still be entitled to that name.

It is my opinion that for a man of only average brain power a university training is of immense value, but that for a clever man it may be definitely bad. It is a very intense course of brain moulding, and often has the effect of blunting natural sharpness.

Some people decide that they are better without a course of training so that their minds may develop naturally, free from the influence of examinations. These people are sometimes far better engineers than your chartered ones, but with the scheme proposed (being unchartered) they would be lost to the profession.

At the same time I admit that there are a great many uneducated men professing to be electrical engineers (particularly amongst the salesmen) who are a disgrace to the profession. But I believe that they will die out naturally with the rapidly increasing importance of the scientific side of the subject.

February 9th. M.ENG., A.M.I.E.E.

I read with interest the letter from "A.M.I.E.E., Assoc. A.I.E.E.," but would point out that there are a number of cases comparable with my own. I have studied at a technical college, I have had an electrical engineering apprenticeship, I have studied all branches of electrical engineering and have a *practical* knowledge of nearly all branches, I have not had time for an intensive study for the A.M.I.E.E. examination, but have been working my way up from the bottom of the ladder.

Give me a practical man who has done this in preference to one who has plenty of time for study, becomes an A.M.I.E.E., then obtains a good post due to his qualifications. Qualifications are not the only things needed when dealing with men, or with tough jobs. Please allow us who can do a job, or supervise it, yes and even use the technical side to advantage, to call ourselves electrical engineers.

Clacton-on-Sea, *February 10th*. H. W. ONGLEY.

British Inventors

No one will dispute that genuine inventions confer immense advantages on the community, as Mr. Runciman admitted handsomely in a recent speech. Whether such inventions should be protected by patents—granted ostensibly to secure some benefit to the inventors—may be open to argument. It may be said that the patent tends to restrict the use of the invention, and to interfere with freedom of design. These would be reasons against granting patents at all; and in the majority of cases the inventor would actually be better off if the whole fabric of the patent law and practice in this country were abolished. Their advantages to the patentee are largely illusory. The basis of the patent law as always quoted by the practitioners, official and otherwise, is that the fortunate inventor is given a monopoly for a term of years in exchange for a valuable invention which falls into the public domain at the conclusion of the term.

How reasonable this sounds! It may have been true when patents were first granted. For instance, a long term monopoly was granted for the manufacture of gunpowder; and no doubt anyone but the grantees who started to make gunpowder would have been punished by the pillory or the stocks. But the idea that a patent grants a monopoly to-day is chimerical. It does

nothing of the sort. It merely certifies that some person claims to be the first and true inventor. Anyone can ignore or dispute the claim; and, unless the inventor is wealthy enough to pay for a ruinous law-suit, with the usual appeals to follow, everyone who is not deterred by his conscience will do so, and all the more easily if he acquires the published specification for one shilling.

The patent is merely a licence to be shot at. It is questionable whether if it were really granted in exchange for the benefits accruing to the public after its lapse (as is so often stated) and free of all expense to the inventor, it would even then be worth his acceptance.

But what is actually the case? It is not really given in exchange at all. On the contrary it has to be paid for "through the nose," the patent fees for a sixteen years' term being £130. This iniquitous and foolish tax kills most of the patents in their youth and according to the fiftieth report of the Comptroller-General (for 1932—the last issued) only 4½ per cent. of the patents granted reached their full term; the other 95½ per cent. were taxed out of existence. The Patent Office handed over to the Treasury a surplus of £146,000 for 1932. This contemptible tribute from inventors probably causes many millions to be lost by the discouragement of invention and enterprise.

Why should not the inventor be able to register his patent on as favourable terms as those granted in the form of copyright to an author? If it is what the French call his "intellectual property" why should he be taxed till he has to abandon his rights? Why should not British inventors be put on an equality with those of the United States, who obtain seventeen years' registration in any State of the Union for £7 down? If an inventor sought protection in every country of our Empire the sum he would have to find would be fantastic. A small reform, even the remission of the Treasury's beggarly £150,000, would have remarkable effects.

The Institution of Mechanical Engineers has appointed a committee to give attention to inventions. I suggest that all the engineering institutions should join in representations to the Chancellor of the Exchequer to take advantage of the present financial position to improve the lot of the British inventor and give him in place of the present "brain-tax" some practical help and encouragement. The small financial sacrifice to the Treasury would be restored many times over in increased business and income-tax. G. WATSON.

Caterham Valley, *February 7th.*

Two-part Tariff Metering

The article upon this subject by Mr. B. Sleath in your issue of February 2nd does not, in my opinion, deal with the essentials of metering a two-part tariff with a prepayment meter in the way that such a matter should be dealt with.

Mr. Sleath suggests that "these instruments can be arranged to collect arrears (if wanted)." Surely in any well-designed tariff it is essential that rental charges be paid irrespective of whether the consumer is away or not. Again, his proposal that the run back (or ability of the meter to indicate arrears) should be limited to, say, four or six coins is likewise a proposal that does not appear to stand investigation. At the present day many authorities have to charge rental for wiring, hire of cooker, and other apparatus that together amount to some shillings per week. Mr. Sleath's meter would not permit the due charges to be collected, and thus the whole basis of these rental charges would be upset.

Many breadwinners are away from home for two weeks' holiday, but their families may remain away for a month. What use would be made with the prepayment meter under such conditions? Would the breadwinner pay several shillings per week just to boil his egg and tea in the morning? Again, Mr. Sleath suggests that in cases where the arrears capacity of the meter has been over-run, an account would have to be rendered to collect these charges. Would any accounts department really like to have a prepayment tariff that might or might not require a bill to be sent to the customer when he least expected it? METER ENGINEER.

February 12th.

Suggestions for a Two-part Tariff

In common with many other small undertakings we have been trying to evolve a domestic tariff which, while being helpful to the undertaking and tending to encourage the extended use of electricity, will be fair to the consumer and simple in principle. In putting forward the following suggestions we are doing so not with the idea that they are adequate or perfect, but rather to invite constructive criticism.

Briefly, our suggestions are as follows:—First, we shall ascertain what has been the average consumption of lighting units per annum per 100 W installed of a great number and variety of consumers over a period of, say, three years. We shall then apportion this between the winter and summer quarters; a consumer will then be informed that he will be charged at the lighting rate for a certain number of units per quarter, based on the wattage installed, and that all further units will be charged for at a very low rate.

It would seem that (1) this will be fair to both large and small installations, with some preference, probably, to the small installation with the better load factor; (2) a consumer will not be penalised if his premises are closed for a period; (3) it is simple and easily understood by the consumer; (4) it should tend to encourage increased consumption for all domestic purposes; (5) it will be applicable to a great number, and variety, of premises; (6) it presents no book-keeping difficulties; and (7) it involves the use of one meter only.

N. FRANK NALDER, *Manager,*
Burford Electric Light & Power Co., Ltd.

Burford, Oxford, *February 13th.*

Electrically Operated Coke-screening Plant

THE British (Guest, Keen & Baldwin's) Iron & Steel Co., Ltd., has recently installed an electrically operated coke-screening plant at its East Moor Works, Cardiff. Its primary purpose is the segregation of the largest coke prior to its passing to the blast furnaces; smaller coke is taken for screening *via* an elevator. The contract for the plant was awarded to the Fraser & Chalmers Engineering Works of the General Electric Co., Ltd., the handling and screening plant (on the Robins system) being manufactured at Erith, while the motors and motor control gear for its operation were made in the G.E.C. Engineering Works at Witton.

Coke is drawn from the main storage bins through a hand-operated gate and fed on to a rotary grizzly screen by a rotary feeder. The grizzly is driven through gearing by a 12½-h.p. totally enclosed "Witton" d.c. motor. The large coke is passed over the grizzly on to a 54-in. belt conveyor which discharges into the scale car. The "throughs" from the grizzly screen are delivered by a chute on to a 24-in. belt conveyor and thence to a 22-in. belt-and-bucket elevator, which delivers the coke on to a single-deck "Gyrex" screen.

The "Gyrex" screen divides the coke into two classes of 1¼-in. to ½-in., and ½-in. to dust, discharging each into a separate bin. The total capacity of the plant is 360 tons per hour, 10 per cent. of which is separated as small coke by the rotary grizzly and taken through the secondary screen.

The plant is equipped with two further 12½-h.p. d.c. totally enclosed motors for driving the elevator and the 24-in. conveyor. The control panels are of the three-step lock-out type. On pushing the "start" push-button the elevator motor starts up; immediately it reaches full speed the 24-in. conveyor motor starts. As soon as this machine reaches full speed a rope-operated master switch is connected into circuit. The 54-in. conveyor and grizzly motor start simultaneously as soon as this switch is operated, and continue to run so long as it is held in the "on" position. On releasing the rope, the switch flies back to the "off" position, and these two motors stop while the elevator and No. 1 conveyor motors continue to run. If the elevator motor shuts down all other motors are automatically stopped and cannot be restarted until the elevator motor is started up.

Similar equipment has been installed in the Margam Works of the same company.

The Fraser & Chalmers-Robins grizzly, the 54-in. belt conveyor and (in the background) the motor contactor starters

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The Marking of Electrical Accessories

The Board of Trade announces that it has given a Direction with regard to the Merchandise Marks (Imported Goods) No. 15 Order, 1933. This Order requires *inter alia*, certain descriptions of imported electrical accessories to bear an indication of origin die-stamped, impressed, embossed, engraved or moulded on each article. The Direction provides that the above requirement shall not apply to electrical accessories which were imported before November 10th, 1933, and are sold or exposed for sale before August 10th, 1934, and to which an indication of origin is applied as follows:—(*a*) stamped or printed on a label securely attached or affixed to each accessory; or (*b*) where the accessory forms a distinguishable part of an electrical fitting or other article stamped or printed on a label securely attached to that article specifying the accessory which has been imported and indicating its origin. The Board has referred to the Standing Committee appointed by it under the Act for consideration, the question whether the Order-in-Council should be amended either in accordance with the terms of the Direction which it has given, or otherwise with respect to the goods in question. Representatives of any interests substantially affected by the above matter, who desire to make representations to the Committee, should communicate with the secretary, Mr. E. W. Reardon, at the Board of Trade Offices, Great George Street, S.W.1, by March 3rd. The Direction is being published and copies may shortly be purchased either from H.M. Stationery Office or through any bookseller.

Two Large Neon Installations

Two large neon installations have recently been erected on buildings of distinctive architecture. The installation at the New Victoria Cinema utilises over 6,000 ft. of tubing; that over the canopies and for the canopies themselves is coloured red, blue and green, the green forming a border to each of the two interchangeable signs. The vertical columns are in blue, and the four monograms 4 ft. in diameter, with scalloped edges are bordered in gold. The "GB" of the monograms are 3 ft. letters in red and are surrounded by an inside border in green. The interchangeable letters for the programme are 36 in. in height and are red. The side of the building is illuminated by lines of red tubing in parallel, emphasising the considerable horizontal length of the building. The whole of the tubing was manufactured by Claude-General Neon Lights, Ltd.

The neon tube installation erected by the Franco-British Electrical Co., Ltd., on the Montague Burton premises at the junction of Tottenham Court Road and New Oxford Street employs 5,000 ft. of tubing and 120 transformers. The entire building is outlined in red and blue, and the upper name signs, 26 ft. long, are made of solid bronze with neon tubes recessed into the face of the letters. By day the tubing is practically invisible.

Neon tube installations erected on the premises of Montague Burton, Oxford Street, and the New Victoria Cinema

The New Dumfries Showrooms

The new showrooms of the Dumfries Electricity Department, which were illustrated in our issue of February 2nd, were formally inaugurated on February 8th. At a function which followed the opening, Judge Kelly, convener of the Electricity Committee, said that they were aiming at a greater use of electricity in the daytime. Mr. A. E. Roots, the electrical engineer and manager, had been able to persuade about 75 per cent. of the power users to take electricity. Since the undertaking was acquired from the supply company twelve years ago they had made great strides, especially in the last two years. Mr. Roots stated that he estimated that the sales for 1934 would total 2,050,000 kWh, as compared with 585,000 kWh in 1922, the year of the transfer of the undertaking to the Corporation. The domestic two-part tariff and the assisted wiring scheme inaugurated in 1931 had proved very successful.

H.M.V. Domestic Appliances

Some particulars regarding the registration of a new company with the name H.M.V. Household Appliances, Ltd., are given on page 256 of this issue. It is there stated that the objects of the company include the production and sale of electric heating, cooking, and other domestic appliances. We understand that the company expects to be able to make an announcement on the matter in the course of the next two months.

Duty on Carbon Electrodes

Representations have been made to the Board of Trade under Section 10 (5) of the Finance Act, 1926 (under which exemptions from import duties may be granted) regarding amorphous carbon electrodes over 3 ft. long, the diameter of which exceeds 12 in. Any communication should be addressed to the principal assistant secretary, Industries and Manufactures Department, Board of Trade, Great George Street, S.W.1, within fourteen days from the date of the notice (February 12th).

Electrical Trade Protection

The annual general meeting of the British Electrical Trade Protection Association was held on January 30th at Sentinel House, London, when the chairman, Major Hogan, presided. The secretary, Mr. H. C. McMillan, reported that work undertaken by the Association during the past year had been successfully carried through. In the Debt Recovery Department under 10 per cent. of accounts handed in for collection proved irrecoverable, while the Enquiry Department had been extensively used with beneficial results to the members. The office bearers elected for 1934 were: Chairman, Major Hogan (Hogan & Wardrop, Ltd.); vice-chairman, Mr. F. W. Evans (National Electrical Supplies Co., Ltd.): Executive Committee: Messrs. P. L. Dwyer (P. L. Dwyer & Co.), and F. J. Godden (John Godden & Co.).

Swedish Engineering in 1933

As a result of inquiries of the leading Swedish engineering concerns, *Swedish Export* finds that the general view is that the worst stages of the depression have been passed and that a brighter period is drawing nearer. Last year electrical business was hampered by the restrictions in force in many countries, and it was often difficult, because of exchange control, to remit to Sweden payments due on contracts. Yet the A.S.E.A. was able to obtain a somewhat larger volume of business than in 1932 in small or medium-sized units, the demand for large installations having waned. The L.M. Ericsson Telephone Company reports that export orders last year were on approximately the same level as in 1932. Exports of water turbines

from the Kristinehamn works of the Karlstads Mekaniska Verkstads A.B. were small. The Atlas-Diesel A.B. felt the depression more severely than the electrical machinery constructors. Foreign sales were only half the figure in 1930, but in the latter half of last year inquiries were more frequent and exports during the whole period showed an increase on 1932.

Conditions in South Africa

With the exception of the gold-mining industry the past two years has been a period of grave depression and difficulty in all branches of industry. A recent Department of Overseas Trade report states, however, that the proportion of United Kingdom trade has been very well maintained, and during the first six months of 1933 British goods formed 51 per cent. of the total imports, a figure which has not been reached for ten years. No particular reference is made in the report to the electrical market.

French Electrical Imports and Exports

The French imports and exports of electrical machinery, apparatus and cognate goods during the nine months ended with September last as compared with the corresponding period of 1932 are shown in the appended tables.

	Imports. January–September. 1932. 1,000 fr.	1933. 1,000 fr.
Dynamo-electric machines and transformers	57,784	47,353
Telegraph, telephone, and other electrical apparatus	168,646	131,372
Dynamo and motor parts	66	5
Incandescent lamps and radio valves	55,480	50,277
Arc lamps and parts	183	123
Carbons for electrical and industrial purposes	5,822	5,626
Electric wires and cables	6,214	36,804
Parts of electrical apparatus	13,735	12,164
Magnets, other than electro-magnets	832	1,157
Accumulators and parts	2,767	2,287
Dry batteries and condensers	8,928	12,290
Porcelain and other insulators	2,425	2,444
Total fr.	322,882,000	301,902,000
Total at 80 fr. to £	£4,036,025	£3,773,775

	Exports. January–September. 1932. 1,000 fr.	1933. 1,000 fr.
Dynamo-electric machines and transformers	39,556	30,754
Telegraph, telephone, and other electrical apparatus	68,453	57,296
Dynamo and motor parts	597	443
Incandescent lamps and radio valves	14,721	13,667
Arc lamps and parts	445	140
Carbons for electrical and industrial purposes	11,628	9,604
Electric wires and cables	19,932	22,157
Parts of electrical apparatus	22,782	12,178
Magnets, other than electro-magnets	381	234
Accumulators and parts	10,142	11,050
Dry batteries and condensers	3,035	1,754
Porcelain and other insulators	8,925	11,271
Total fr.	200,597,000	170,548,000
Total at 80 fr. to £	£2,507,462	£2,131,800

A Metal Exhibit at Birmingham

Particulars of the display by Messrs. Rd. Johnson & Nephew, Ltd., at the Birmingham Section of the British Industries Fair reached us too late for inclusion in our notes on the exhibits. The company is showing specimens of steel-cored aluminium conductors, including multi-ply wires varying from 7 ply to 61 ply. There are also copper and cadmium-copper transmission wires, while the advantages of "Crapo" galvanising are being demonstrated.

A Revo Display at Cardiff.

The accompanying illustration shows a window display of "Revo" cookers and domestic appliances which was recently arranged in one of the showroom windows of the Cardiff

A "Revo" display of domestic appliances

Corporation Electricity Department. It is interesting to note how attractive such a display can be when careful arrangement is helped by simple drapings.

E.D.A. Public-speaking Competition

The women's competition for the London and South-East England area will be held at E.D.A. headquarters on Thursday, February 22nd, at 7 p.m. The men's competition for the same area will begin at 10 a.m. on Friday, February 23rd. All who are interested are invited to attend.

Japanese Electrical Control in Manchukuo

The Tokio newspapers announce that a beginning has been made in Manchukuo in the direction of the union of all the electrical undertakings in the country in one company under Japanese control. In this company, which is termed the Kenkoky Denkin Kaisha, and has a capital of 60 million yen, several electricity undertakings have already been embodied, including those at Mukden, Harbin and Chanchunya. At present there are fifteen Japanese electricity undertakings in Manchukuo with a total capital of 54 million yen, and sixty Manchukuan undertakings with a capital of 25 million yen.

Floodlighting in Mandalay

The floodlighting installed at Government House, Mandalay, in connection with the Christmas activities proved a success, as the accompanying illustration shows. It was carried out

The floodlighting of Government House, Mandalay

by the Burma Electric Supply Co., Ltd., which employed a number of G.E.C. floodlights equipped with 1,000-W Osram lamps.

Registered Electrical Contractors

Applications for registration from the following were accepted by the executive committee of the National Register of Electrical Installation Contractors at its last meeting:—

Constable, N. A., Manchester.
Meta, Ltd., Chorlton-cum-Hardy, Manchester.
Woolham, W. G., Collyhurst, Manchester.
Barr, P. L., Denton, Nr. Manchester.
West, T. M., Leeds.
Strode, H., Turbrook, Liverpool.
Fisher, J. E., Withington, Manchester.
Springer, R., Manchester.
Williams, F. & Co., Chorlton-on-Medlock, Manchester.
Batchelor, J. H., & Co., Altrincham.
Smith, S., West Didsbury.
Thornton, S., Wrexham.
Barratt & Thornton, Chorlton-on-Medlock, Manchester.
Hayman, J. H., & Co., East Ham.

At the same meeting one application was withdrawn and four were declined.

E.I.B.A. (South Coast Branch)

The South Coast Branch Centre of the Electrical Industries Benevolent Association is holding a dance on March 16th, at the Grand Hotel, Brighton. Further particulars can be obtained from Mr. B. S. H. Warde, the hon. organising secretary of the branch, c/o Cryselco, Ltd., 59, Ship Street, Brighton.

New D.O.T. Publications

The Department of Overseas Trade has just issued reports on the economic situation in Belgian Congo (price 2s. 6d.) and the Dominican Republic and Hayti (price 2s. 3d.). Copies may be obtained from H.M. Stationery Office.

The Batti-Wallahs' Society

The next luncheon of the Society will be held on February 28th at the Hotel Metropole, W.C.2, when an address will be given by Mr. H. N. Gresly, C.B.E., chief mechanical engineer, L. & N.E. Railway.

Social Event

Members of the E.D.A. Circles of the Midland Electric Corporation and the West Midlands Joint Electricity Authority held their sixth annual dinner at the Bell Hotel, Stourbridge, on February 7th. There was an attendance of about 100, including a large number of contractors, presided over by Mr. G. R. G. Parkinson (chief engineer of the Midland Electric Corporation), who proposed "The Circles." He expressed satisfaction that negotiations which for three years had been proceeding beween his company and various municipal authorities had been completed. The 10 per cent. reduction in charges asked for had been allowed. There had been a further re-

duction of a like amount, and he was hopeful that in the near future there would be an additional 5 per cent., thus making the charges for electricity 25 per cent. lower than they were three years ago. The circles were doing an enormous amount of good by making the advantages of electricity known and insisting on proper installations. Mr. E. F. Hetherington (chief engineer of the West Midlands Joint Electricity Authority), who responded, paid tribute to the useful work done by the circles. Though the development of electricity in Shropshire had not been as rapid as some people wished, the organisation he represented had already spent £200,000 in that county. Supplies had been provided in Wellington, Newport, Shifnal, and a large number of villages, and as soon as the financial results were shown to be sound, further extensions would be considered.

The B.E.A.M.A. Dinner

The annual dinner of the British Electrical and Allied Manufacturers' Association will be held on May 17th at the Connaught Rooms, Great Queen Street, W.C. Lord Derby, the president, will preside.

New Showrooms at Exeter

New electrical showrooms were opened on February 7th at 39 and 40, North Street, Exeter, by Messrs. F. D. Newcombe and Co., Ltd., who were formerly in business at Catherine

Messrs. F. D. Newcombe's new showrooms at Exeter

Street. Electrical traders and friends from towns in the West of England attended the opening ceremony. The building, which is of steel throughout, consists of four floors, accessible by means of an electric lift. The ground floor is devoted to electrical accessories and the mail order department, while on the second floor is the showroom, which has direct access from the street. This showroom is of the most up-to-date style, containing a comprehensive display of goods without overcrowding. All the lighting fittings are wired up separately, and may be switched on independently of each other. On the two higher floors are the gramophone record department and the workshop of the radio engineer and his assistant, whose task it is to see to the "servicing" of receivers.

"Exide" Activities

The next meeting of the Midland Section of "Exide" service agents will be held on February 21st at the British Industries Fair, Castle Bromwich, commencing with luncheon (3s. 6d.) at 12.30 p.m.

An "Exide" radio and motor trade dance and cabaret will be held at the Grand Hotel, Bristol, on February 23rd. Tickets (2s. 6d. each) can be obtained on application to the Exide Depôt, 16-18, Broadmead, Bristol.

Callender's Hospital Fund

The general meeting of Callender's Hospital Fund was held on February 3rd at the Belvedere Works, Mr. H. Hill taking the chair. Despite financial stringency, the Fund has maintained its excellent service, and the grants made last year to hospitals, &c., were only slightly less than in the previous year, the total being £735, while £145 was paid out in distress grants.

Trade Announcements

Messrs. Brown Bros., Ltd., have acquired the business of Messrs. S. Webster & Co., Lombard Street, Hull.

An arrangement has been entered into between G. W. B. Electric Furnaces, Ltd., and Shell-Mex and B.P., Ltd., whereby a new quenching oil will be marketed under the name "Shell-Wild Barfield."

The British Executive Employment Society

In a circular letter on the objects and aims of this Society, Mr. G. F. Dowding, A.M.I.Mech.E., vice-chairman, draws particular attention to the employment section. This department deals with two distinct branches, one technical and the other non-technical. The aim of the technical bureau is to provide a direct means of finding the right type of men with the right experience, thus being more selective than any of the prevailing methods open to employers, and to foster active connection with employers, corporations, and institutions as well as technical journals throughout the country. The Society appeals to employers to give it the first opportunity of submitting particulars of suitable men for positions on their staffs.

Recent Contract

A contract recently received by the General Electric Company, Ltd., includes seven large induction motors, phase-advancers and switchgear, for installation in the Kemsley paper mills of Messrs. Edward Lloyd, Ltd. Each motor is rated at 2,500 h.p. when running at 250 r.p.m., on a 6,600-V 3-phase 50-cycle supply. The phase advancers will provide for power factor correction to 0.9 leading when the motors are running at full load. The control gear for each motor consists of an oil circuit-breaker and a motor-operated liquid starter, a separate control panel being supplied for each machine. The contract also includes a fifteen-panel 6,600-V switchboard of the truck cubicle design. The oil circuit-breakers are motor-operated, and have a breaking capacity of 500,000 kVA, those for the motor circuits being remote-electrically operated from the motor control panels. The whole of the equipment will be designed and manufactured at the engineering and switchgear works of the company at Witton.

A New German Cable Association

The leading makers of cables and conductors are already combined in the "Vauelfa" and are able to point as a guarantee of the quality of their products to the tests made on their behalf by the Association of German Engineers. Now the independent makers of cables and conductors have formed a mutual protection association under the title of "Ikafa," and they have entered into an agreement with the Reich Physical-Technical Institute of Berlin, which will supervise the products of the members from the quality point of view.

Price of Materials

The following prices are only general, and they may vary according to quantities and other circumstances:—

CHEMICALS, ETC.	Price, February 14th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19 15s.	—
a Potash Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£4 18s.	—
a Sulphur Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3¾d.	—
a ,, Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. nett.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ... ,,	1/2 to 2/9	—
p Babbits Metal and Anti-friction Metals.—		
Grade I ... ... per ton net	£203	£2 dec.
Grade II ... ... ,,	£140	—
Grade III ... ... ,,	£68	—
c Brass (rolled metal 2" to 12" basis) per lb.	7d.	—
c ,, Tubes (solid drawn) ... ... ,,	9d. to 9¼d.	—
c ,, Wire, basis ... ... ,,	7¼d.	—
c Copper Tubes (solid drawn) ... ,,	10d.	—
g ,, Bars (best selected) ... per ton	£64	—
g ,, Sheet ... ... ,,		£2 inc.
g ,, Rod ... ... ,,		—
d ,, (Electrolytic) Bars ... ... ,,	£36 15s.	10s. dec.
g ,, ,, Sheets ... ,,	£35 17 6 to £36 7 6	12s. 6d. to 22s. 6d. dec.
d ,, ,, Wire Rods ... ,,	£42 5s.	10s. dec.
d ,, ,, H.C. Wire ... per lb.	7¼d.	⅛d. dec.
f Ebonite Rod ... ... ,,	1/3 to 1/6	—
f ,, Sheet ... ... ,,	1/3 to 1/6	—
n German Silver Wire ... ... ,,	2/2	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	4¼d.	¼d. inc.
i Iron, Pig (Cleveland No. 3) ... per ton	62/6	—
i ,, Wire galv. No. 1, P.O. qual.... ,,	£20	—
g Lead, English Pig ... ... ,,	£13	5s. inc.
g Mercury ... ... per bot.	£9 10s. to £9 15s.	—
c Mica (in original cases) small ... per lb.	6d. to 3/6	—
e ,, ,, medium ... ,,	4/– to 8/–	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, ,, drawn bars & rods ,,	11d.	—
p ,, ,, rolled strip & sheet ,,	11d.	—
p ,, ,, wire ... ... ,,	11¼d.	¼d. inc.
o Platinum ... ... per oz.	£7 15s.	—
d Silicium Bronze Wire ... ... per lb.	8¼d.	⅛d. dec.
r Steel, magnet, in bars ... ... ,,	7¾d.	—
m Tin, Block (English) ... ... per ton	£226 10 to £228 10	15s. dec.
g ,, Wire, Nos. 1 to 16 ... ... per lb.	3/5	—

Quotations supplied by:—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Ltd.
m P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. R. Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead and rubber, up to the time of going to press, are given in our "Business Notices" under the same heading.

A Birmingham Handbook

Visitors to the Birmingham Section of the British Industries Fair will find much of interest in the "Handbook for 1934" published by the City of Birmingham Information Bureau. This records in its 300 pages developments in the Corporation's social services and indicates the virile growth of the City's various trading undertakings.

The Timber Market

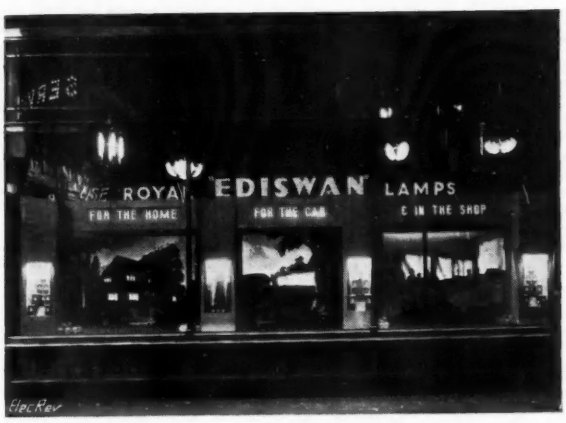
Our Timber Trade Correspondent reports that the demand for European and Canadian woods has been fairly large over the past month as compared with the corresponding one of 1933. Hardwoods have been in moderate demand during the month; spot mahogany logs are short, and prices are rising. American woods are plentiful, and have been in better demand compared with the previous month.

The N.Z. Market for Pumps and Fans

A report on the trade in pumps, fans and blowers in New Zealand has just been issued by the Department of Overseas Trade. Except for a small share of the trade held by Australia and the United States, the bulk of the import market is held by Great Britain. In 1932 pump imports amounted to £15,019 as against £19,693 in the preceding year, while purchases of blowers and fans declined from £6,480 to £2,713.

The Argentine Radio Market

In spite of the general trade depression, imports of radio apparatus and accessories into Argentina have steadily increased during recent years. A Department of Overseas Trade report says that the value of imports has risen from $1,518,650 in 1928 to $2,685,162 in 1932, the figure for the first six months of 1933 being $1,515,560. United States manufacturers practically monopolise the trade, having supplied 86 per cent. of



A display in the Charing Cross Road windows of the Edison Swan Electric Co., Ltd., demonstrating how efficiently lighting can be used for lamp displays

the radio receivers and 94 per cent. of the accessories imported during 1932. Their success is mainly due to the fact that they are able to market apparatus of high selectivity at a low price, and unless British manufacturers are willing to give at least as favourable terms and supply their agents with the type and quality of receiver required for this market they will stand little chance of securing any important share of the market.

Catalogues Wanted

The Forward Electrical Co., 46, Holloway Head, Birmingham, asks for up-to-date lists and terms.

New Catalogues and Lists

Lescum Manufacturing Co., Ltd., Millhurst Works, Stradella Rd., S.E.24.—Leaflet describing the "Presto" water heater.

Elliott Bros. (London), Ltd., Century Works, Lewisham, S.E.13.—A pamphlet describing the "Elliott" transmission system for the remote indication of electrical and mechanical movements.

F. C. Heayberd & Co., 10, Finsbury St., E.C.2.—A leaflet on a new portable battery charger.

Berkeley & Young, Ltd., Tyseley, Birmingham.—A small booklet on "B. & Y." electric irons.

Whipp and Bourne, Ltd., Switchgear Works, Castleton, Manchester.—A well-bound sectional switchgear catalogue.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.—Particulars of Henley indoor vertical wall-type terminal boxes (Cat. UE2). Cat. UE6 has been withdrawn and the contents included in the above.

Davidson & Co., Ltd., Sirocco Works, Belfast.—Publication No. S.F.41 on air-conditioning plant.

Ateliers de Constructions Electrique de Charleroi, 56, Victoria St., S.W.1.—February stock list.

General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.—A new industrial lighting equipment catalogue.

W. E. Beardsall & Co., Ltd., Victoria Bridge, Manchester, 3.—Leaflets dealing with the "Cinderella" vacuum cleaner, fires and table lamps.

Hailwood & Ackroyd, Ltd., Morley, Nr. Leeds.—A leaflet illustrating new "Hailware" lighting fittings.

Brook Motors, Ltd., Empress Works, Huddersfield.—List No. 368 describing the company's "Special" motors.

Windle Oil-Firing, Ltd., 102, Nursery Road, Hockley, Birmingham.—A folder describing the oil burners mentioned in our recent article on "Illuminating Glassware Production."

H. J. Scott & Co. (Belfast), Ltd., Volt Works, Ravenhill Avenue, Belfast.—A folder giving particulars of Scott motors.

Patent Switch & Fuse Indicator Co., Ltd.—A revised price list and a showcard advertising "Everlight" indicators.

Edison Swan Electric Co., Ltd., 155, Charing Cross Rd., W.C.2.—Booklets No. H.C.922 and 923 of "Trinity" low-temperature heating systems and "Ediswan" sunlamp and electro-medical apparatus.

Bankruptcy Proceedings

G. S. Whiston, 112, West Street, Crewe, Cheshire, electrical engineer.—At the public examination of this debtor, held on February 8th at the Petty Sessional Court House, Crewe, it was disclosed that the deficiency amounted to £1,193. The failure was attributed to unemployment among railwaymen. Debtor stated that he commenced business with a capital of £10. The examination was closed.

E. C. G. Hefti, electrician, 10, Dean Road, Scarborough, formerly trading at 42, Hanover Square, Manningham Lane, Bradford.—This debtor's application for discharge was heard at Scarborough, on February 6th. The receiving order was made in 1931, and the Official Receiver reported that the statement of affairs returned showed ranking liabilities of £688. The Judge granted debtor his discharge, subject to one month's suspension and judgment for £170.

Electra Contracting Co., electrical contractors, 157, Richmond Road, Cardiff.—Receiving order made February 1st on a creditor's petition.

E. G. van der Veen (County Radio Service), wireless dealer, 133, Shaftesbury Street, Newport, Mon.—Receiving order made February 1st on debtor's own petition. First meeting, February 21st, at 22, Stow Hill, Newport. Public examination, March 6th, at the Town Hall, Newport.

E. P. Sturgeon, electrical engineer, 88, Northgate, Hartlepool.—Trustee, Mr. T. A. Stoker, 71, Albion Street, Leeds, released December 15th.

W. R. Blakeway (Pearson & Co.), electrical contractor, 31, High Street, Southampton.—Last day for receiving proofs for dividend, February 23rd. Trustee, Mr. H. W. Miles, 44, Above Bar Street, Southampton.

C. H. Fisher, electrical and wireless engineer, 3, New Road, Durrington.—Receiving order made February 2nd on debtor's own petition. Public examination March 1st at the Guildhall, Salisbury.

J. R. C. August, electrical engineer, 9, Downsview Road, Upper Norwood, Surrey.—First meeting February 16th at 29, Russell Square, W.C. Public examination March 22nd at the County Court, Croydon.

A. C. R. Birkett, electrical engineer, 22 and 24, Wheeler Gate, Nottingham.—Application for discharge to be heard on March 23rd at the County Court House, Nottingham.

S. J. Garrod (Electrical Repair & Manufacturing Co.), 181, St. John Street, E.C.—Discharge suspended for three months until April 11th, 1934.

J. Glickman (Manchester Radio Service), wireless factor, 10, 12 and 14, Great Ducie Street, Strangeways, Manchester.—Last day for receiving proofs for dividend February 21st. Trustee, Mr. F. Murgatroyd, Byrom Street, Manchester, Senior Official Receiver.

C. B. Greenhough, radio engineer, 56, Old Street, Ashton under-Lyne.—First and final dividend of 4s. 3d. in the £, payable February 14th at the Official Receiver's office, Byrom Street, Manchester.

C. E. Wooton, electrical engineer, 10, Cemmaes Terrace, Collett Road, and 109, Marlowes Road, Hemel Hempstead.—First and final dividend of 2s. in the £, payable February 14th at 9-11, Cursitor Street, E.C.4.

S. Colbert, 350, Kirkstall Road, Leeds, Yorkshire, electrician and wireless dealer.—The public examination herein was closed at the County Court House, Albion Place, Leeds. The statement of affairs lodged showed a deficiency of £788.

Private Arrangements

N. Gould and C. Atkinson, trading as the "A.G. Radio Stores," 39, Meadow Road, and 58, Kirkstall Road, Leeds.—At a meeting of creditors, a statement of affairs was submitted which showed liabilities of £2,056, and net assets of £779, leaving a deficiency of £1,277. A trading and profit and loss account covering the period from November 2nd, 1931, to February 6th, 1934, was submitted, which showed purchases of £10,404, against sales of £11,933, with a gross profit of £1,876. The net profit was £266, whilst the drawings of the two partners totalled £1,243. The business was commenced on November 2nd, 1931. A year later they took additional premises. The greater portion of the business had been transacted under hire-purchase agreements. It was decided that a deed of assignment should be executed to Mr. C. H. Baker, of Messrs. Charles H. Baker & Co., Standard Buildings, City Square, Leeds, with a committee of inspection consisting of the representatives of the Albion Electric Stores, Appletons (Leeds), Ltd., E. Robertshaw & Co., Ltd., and the Bradford Guarantee Co.

G. A. House, radio and electrical engineer, 195, High Street, Deal.—At a recent meeting of creditors at Ramsgate a statement of affairs was submitted showing liabilities of £901 due to unsecured creditors, and net assets of £567, leaving a deficiency of £334. It was stated that the debtor commenced trading in 1926, when his father advanced him a sum of £250. The drawings had never been more than £2 per week. It was decided that the matter should be dealt with under a deed of assignment in favour of Mr. W. A. J. Osborne, of Messrs. Corfield & Cripwell, Balfour House, Finsbury Pavement, E.C., together with a committee consisting of Mr. C. Latham, and the representatives of Itonia, Ltd., and J. J. Eastick & Son.

Company Liquidations

Albion Electric Lamp Works, Ltd.—Winding-up voluntarily. Liquidator, Mr. C. A. Smith, 26, Budge Row, E.C.4

Hexham & District Electric Supply Co., Ltd.—Meeting March 14th at Carliol House, Newcastle-on-Tyne, to receive an account of the winding-up by the liquidator, Mr. C. Skipsey.

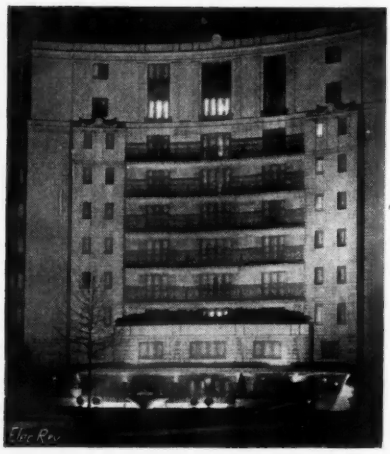
Electricity Supply

Lighting, Domestic, Power

Aberdeen.—LOAN.—The Town Council at its last meeting agreed to apply for sanction to borrow further sums of £80,000 for mains and services and £7,000 for consumers' apparatus (for hire) to cover expenditure for a further three years. The Council is also seeking sanction to borrow £7,237 for an e.h.p. cable to Cults sub-station.

Barrow-in-Furness.—EXTENSIONS.—It is intended to make application to the Electricity Commissioners for sanction to borrow £20,000 for mains and services during the next two years. It is proposed to lay a main across Lake Windermere at an estimated cost of £420, subject to the guaranteeing of a revenue of £40 per annum for five years.

FRINGE ORDER.—The Electricity Committee is to seek a Fringe Order to supply High Duddon, Broughton.



The curved and terraced front of Dorchester House, London, W., presented a fairly difficult floodlighting problem, but our picture shows that it has been solved very satisfactorily

Bewdley.—ELECTRICITY FOR COUNCIL HOUSES.—The Town Council has consented to the Shropshire, Worcestershire & Staffs Electric Power Co. supplying electricity to Council houses.

Blyth.—ELECTRICITY FOR SCHOOLS.—The Education Committee is to install electricity at the Princess Louise school and obtain estimates for a supply to other schools where electricity is available.

Bromley.—SUPPLY IN KESTON AND HAYES.—The West Kent Electric Co., Ltd., has informed the Town Council, with regard to the supply of electricity to Keston and Hayes, that it is not desirous of parting with its distribution rights in those parishes and that it had already made an effort to reconcile differences by considerable reductions in the two parishes named. In his reply, the town clerk has intimated that the Corporation will probably raise the matter again in some suitable manner.

The Electricity Committee has approved capital expenditure amounting to £39,343, owing to the rapid increase in the load, for the works and equipment necessary to meet the anticipated demand during next winter.

Buntingford (Herts).—ELECTRIC PUMPING.—The Rural District Council has decided to adopt electricity for pumping at the waterworks, the installation to cost about £500. The North Metropolitan Electric Power Supply Co. will supply power at a cost of £1 1s. per month, plus ¼d. per kWh.

Canterbury.—BULK SUPPLY.—The City Council is negotiating with the Central Electricity Board with a view to concluding an agreement to take a bulk supply of electricity during eight months of the year, with a partial supply during November, December, January, and February. It is understood that when a supply is taken from the grid the city can no longer continue to supply Herne Bay.

Cardiff.—NEW MAINS.—The Electricity Committee is to replace mains in Newport Road at a cost of £2,000, and it reports that it is necessary to provide another feeder between the Roath power station and the Hayes sub-station, and tenders for the switchgear required are being invited.

LOAN.—Sanction has been obtained to a loan of £2,500 for the erection of three sub-stations.

CINEMA TARIFFS.—The Electricity Committee has instituted the following rates for cinemas giving all-day performances: First 20,000 kWh, 1¼d. per kWh; above this amount, 1¾d. per kWh. For cinemas giving only evening performances the rates are to be 2¼d. for first 20,000 kWh and 2¾d. above that amount.

Carlisle.—EXTENSIONS.—The Electricity Commissioners have sanctioned the borrowing of £3,892 by the City Council for the provision of mains and plant in connection with a supply of electricity to Kirkandrews, Beaumont, Burgh-by-Sands, and Warwick Bridge. The Council also intends extending mains in the Carlisle area at £1,896, and in the rural area at £537.

ELECTRICITY FOR BLACKFORD?—The Westlinton Parish Council has agreed to ask the Carlisle City Council to supply electricity to the parish of Blackford.

Chanctonbury (Sussex).—OBJECTION TO OVERHEAD LINES.—The Rural District Council has decided to object at an inquiry to the use of overhead lines by the Steyning Electric Light Co. at Sullington Warren, which has been taken over by the National Trust. The Council had endeavoured to persuade the company to lay underground mains, but it will only do so if the owners pay the difference in the cost.

Cheltenham.—LOAN.—The Electricity Committee is applying for sanction to borrow £15,000 for mains and services.

Coventry.—"OSIRA" DEMONSTRATION.—A new installation of "Osira" lamps was switched on before a large gathering last Tuesday at Stoke, near Coventry. The company was first shown "Telephone Road," a broad thoroughfare about a quarter of a mile long, lighted by ordinary electric lights in "Wembley" lanterns, with high-power gasfilled lamps. Later, this lighting was extinguished and the "Osira" lamps were switched on. A considerable improvement in the lighting was noticeable, although the loading was only 3¼ kW as compared with 6½ kW in the filament-bulb installation. The improved distribution of the light was due in part to the use of the special refracting lanterns which the G.E.C. has developed for the "Osira" system.

Dorking and Horley.—EXTENSION.—The Horley District Electric Light Co., Ltd., has applied to the Rural District Council for permission to run overhead lines in Coney Lane and Chapel Lane, Charlwood.

East Grinstead.—LOAN.—In connection with the application of the Urban District Council for sanction to borrow £7,000, the Electricity Commissioners have sanctioned the borrowing of £6,000, but require further particulars regarding the item of £1,000 in respect of domestic apparatus.

East Ham.—EXTENSIONS.—The Electricity Committee is to prepare estimates for cable extensions and a sub-station in the Milton Avenue district.

Eccles.—SUPPLY EXTENSION.—The Electricity Committee has prepared details for the provision of supply to the Westwood Park Estate, where there are 725 houses, at a cost of £11,308.

Faversham.—TWO-PART TARIFF.—The Town Council has adopted a two-part tariff as an alternative to the present flat rate.

Hove.—LOAN.—The Electricity Committee recommends that application be made to borrow £7,900 with a view to improving the d.c. supply.

YEAR'S WORKING.—We regret that in our last issue the figures for Newark-on-Trent were placed under Hove. Mr. Swarbrick, the Hove borough electrical engineer, informs us that the figures for his undertaking were as follows: Revenue, £100,762; working costs, £51,455; net profit, £11,886; sales of electricity, 10,399,004 kWh. Corresponding figures for the year ended March 31st, 1932, were: Revenue, £91,529; working costs, £51,455; net profit, £7,592; amount of energy sold, 9,179,574 kWh.

India.—HARNESSING THE INDUS.—A new hydro-electric project for harnessing the Indus at Malakand has been fully investigated by Mr. H. P. Thomas, chief electrical engineer, Punjab, reports our Bombay correspondent. The cost of the scheme is estimated at Rs. 40 lakhs. From Malakand to Peshawar the transmission line will be 72 miles long and will be built at a cost of Rs. 12,500 per mile on the main line and Rs. 4,000 per mile on the branch line. The scheme involves lengthening the existing 2¼ miles long Malakand tunnel by half a mile. It will give a fall of about 250 ft. to the turbines in the power house. The project will be capable of yielding 12,000 kW in its first stage, but it will be possible to increase it by further stages. The voltage will be 66,000, and that of the distribution line, which will be on the grid system, will be 11,000 V a.c. It is understood that energy will be sold at 4 ans. a kWh for lights and fans and at 1 anna for agricultural purposes. Energy will also be available for sugar manufacturing and refining. The project will be completed within three years.

Ipswich.—The Electricity Committee has arranged with the Catchment Board for the construction of a dam, at a cost of £3,250, with the object of increasing the supply of condensing water for the power station. The cost of the work will be £1,600.

EXTENSIONS.—The Electricity Committee is to extend mains to Martlesham at a cost of £915 and to Hanley at a cost of £1,322, and provide switchgear and transformers at a cost of £1,450 at the Barrack Hospital sub-station. A main is also to be laid from the power station to Lattice Barn at a cost of £3,255.

SUB-STATION.—The Electricity Committee has approved a revised scheme for the erection of a sub-station at Mayor's Corner at a cost of £1,000.

CHANGE-OVER.—The Electricity Committee has agreed to make a grant of £1,000 to the Hospital Board in connection with the reorganisation of supply to the East Suffolk and Ipswich Hospital, rendered necessary through the proposed change-over.

Lincoln.—NEW MAINS.—New main cables are to be laid in the Cross Street area at a cost of £6,000.

Liverpool.—CLARENCE DOCK LOAN.—Application is being made by the Clarence Dock Power Station Special Committee for sanction to borrow a further sum of £30,184 for the com-

pletion of the first stage of the Clarence Dock Power Station.

I.M.E.A. CONVENTION.—Mr. P. J. Robinson, city electrical engineer of Liverpool, has put before the Electricity Committee suggestions to give Liverpool an appropriate atmosphere during the annual convention, to be held from May 28th to June 2nd, of the Incorporated Municipal Electrical Association, of which he is president. There will be an electrical exhibition in the St. George's Hall, and three of the principal buildings in the city, the Town Hall, St. George's Hall, and Adelphi Hotel (which will be the headquarters of the Convention) will be floodlighted.

TARIFF FOR BATTERY CHARGING.—Consideration has been given by the Electric Power and Lighting Committee to the charges for electrical energy used for automobile battery charging. It has been decided that the charge shall be ½d. per kWh, the supply to be available only between the hours of 7 p.m. and 6 a.m., and the supply to be controlled by a time switch supplied to the consumer at 5s. per quarter.

London.—HACKNEY.—The Electricity Committee is to improve the supply in the Mare Street area at a cost of £1,750.

The Electricity Committee is to provide supply to tenements on the estate of the Industrial Dwellings Co., Ltd., Amhurst Road, at a cost of £2,200.

Malvern.—LOANS.—The Urban District Council has received sanction to borrow £5,000 for mains and services, and has applied for loans of £1,000 for meters and £4,000 for transformers.

Maybole (Ayrshire).—ELECTRICITY DELAY.—Tenants of municipal houses are complaining that, although they have been in the houses for over a month, they have still to use candles owing to the delay in installing electric light. It is stated that the delay has been caused by the difficulty of Ayrshire Electricity Board in obtaining delivery of shilling-in-the-slot meters. The Town Council has protested to the Ayrshire Electricity Board.

Nether Wyresdale.—CANVASS.—It has been decided to make a canvass of the Nether Wyresdale district to ascertain the demand for electricity.

Newark-on-Trent.—YEAR'S WORKING.—The figures for the year's working for the year ended March 31st, 1933, are as follows:—Revenue, £19,323; working expenditure, £12,561; profit, £3,249; sales of energy, 3,331,000 kWh. The corresponding figures for 1932 were respectively £18,135, £11,806, £2,979 and 2,930,000 kWh. These figures were erroneously attributed to Hove in last week's issue.

Northallerton.—LOWER CHARGES WANTED.—The U.D.C. has decided to send a letter to the North-Eastern Electric Power Co. requesting it to lower the present charge of 7d. per kWh for lighting purposes. It was stated that other councils had made successful protests.

Northern Ireland.—DOWNPATRICK.—The new supply for the town was inaugurated on February 7th. The scheme, which provides domestic, street lighting and power supplies, is under the control of the Electricity Board of Northern Ireland. Among those present at the inauguration were Mr. Malcolm Gordon, chairman of the Electricity Board; Mr. C. R. Westlake, chief engineer; and Mr. Baxter, local representative.

Nottingham.—ELECTRICAL WORK.—The City Council is going to spend a further £250,000 upon its supply undertaking. It is anticipated that £110,000 will be required for underground mains and services, £35,000 for meters, £20,000 for assisted-wiring installations, £17,500 for consumers' domestic appliances, and £67,500 for sub-stations and equipment.

Otley.—SUB-STATION.—The Yorkshire Electric Power Co. is to erect a sub-station in Charles Street.

Oxford.—LOAN.—The Electricity Committee is to apply for sanction to a loan of £10,000 for meters for the next two years.

Rotherham.—NEW CABLE.—The Electricity Committee is to lay a cable to the Eastdene district at a cost of £750.

Russia.—ELECTRICAL DEVELOPMENT.—At the recent congress of the Communist Party, the programme for the completion of the technical reconstruction of the entire national economy and growth of production of the Second Five-Year Plan presented by the State Planning Commission of the Soviet Union was adopted. The congress considered that special attention should be given to the construction of seventy-nine district power stations, including the completion of the Zuevo station with a capacity of 250,000 kW., the Gorki station (204,000 kW), the Shatura station (180,000 kW), the Dubrovka station (100,000 kW), the Svir No. 2 station (96,000 kW), and the Dniepr State power station (558,000 kW). The projected new stations include Bobriki (250,000 kW), Kemerovo (148,000 kW), and the Chirchik No. 1 (170,000 kW).

Reuter's Trade Service says that, with the development of existing power stations and the construction of new ones, the output of electrical power in 1937 should reach 38 milliard kWh, the total capacity being placed at 10.7 million kW, an increase of 6 million kW in five years. During the second five-year plan, special attention is to be devoted to the electrification of the eastern regions. The total capacity of power stations in the Urals and Western Siberia will attain two million kW. The construction of new power stations is being continued in Central Asia, where the power capacity should reach 256,000 kW in 1937, and electrification work in Transcaucasia is also proceeding. The construction of a gigantic Volga system of hydraulic power stations is also being carried out. This system will include the stations at Yaroslavl (100,000 kW), Perm (310,000), and Gorky (200,000), and will come into operation at the beginning of the third five-year plan.

HIGH-VOLTAGE GENERATOR.—The Tass Agency (Moscow) reports that the Pan-Ukrainian Physico-Technical Institute has constructed an electrostatic generator making it possible to obtain a continuous current of 4 to 5 million volts. Up to the present the Institute had produced high-voltage installations with continuous current up to 700,000 volts and alternating current up to two million volts.—*Reuter's Trade Service.*

AN ARCTIC POWER STATION.—The first stage of work on the most northerly power station in the world has just been completed, reports *Reuter's Trade Service* from Moscow, the first turbine (20,800 h.p.) having been installed at the new Nivsky hydro-electric station, which lies beyond the Arctic Circle. The production of electricity will start not later than May; a second turbine will start running in the second quarter of the year and a third in the autumn. A fourth set will be added later.

St. Helens.—The Town Council has introduced a revised scale of charges for electricity. For domestic premises having a rateable value of £11 or under there will be a fixed charge of 17½ per cent. on the rateable value; £12 to £20 (inclusive), 12½ per cent., and over £20, 10 per cent. All charges are plus ½d. per kWh, payable quarterly, and subject to a minimum payment of £2 10s. per annum.

St. Monance (Fife).—SUPPLY WANTED.—Representatives of the Town Council are meeting the Fife Electric Power & Light Co. to make final arrangements with a view to electric light being available as early as possible.

Scarborough.—NEW SWITCHGEAR.—The Town Council is to make an application to the Electricity Commissioners for sanction to borrow £4,300 for replacing certain of the existing switchgear at the generation station in Seamer Road with new switchgear.

EXTENSION.—The Town Council proposes supplying electricity to the Gryphon Leather Works in Scalby Road.

South Africa.—JOHANNESBURG EXTENSIONS SANCTIONED.—The Transvaal Provincial Administration has now sanctioned the second stage of the extensions to the Johannesburg municipal power station, and the City Council has voted £280,000 for carrying out the work. The present requirements include a 15,000-kW turbo-alternator and two boilers. This will carry the scheme into 1936, when further extensions will be made which will be sufficient until 1942, the total estimated cost being £557,000. A partial supply will be taken from the Victoria Falls & Transvaal Power Co., Ltd.

South Shields.—ROTARY CONVERTOR WANTED.—Tenders are to be obtained by the Town Council for the supply of a modern rotary convertor for the electricity works to cost £3,000. Mr. James Edgar is the borough electrical engineer.

Stockton-on-Tees.—ELECTRICITY FOR SCHOOLS.—The Education Committee has decided to substitute electric lighting for gas in Stockton Schools. The Richard Hind and Hume Street Schools are to be dealt with first.

Sutton Coldfield.—LOAN.—The Electricity Committee is applying for sanction to borrow £25,000 for unspecified distribution works.

IMPROVED SUPPLY.—The Electricity Committee has authorised the electrical engineer to carry out an amended scheme for the improvement of the supply to Little Sutton, Canwell and Roughley districts at a cost of £1,723.

SUPPLY EXTENSION.—The Electricity Committee is to prepare a scheme for supplying electricity to the Wylde Green Estate.

Tamworth.—OFFER TO PURCHASE UNDERTAKING.—The Town Council has received two offers to purchase the electricity undertaking, one being from the Tamworth District Electric Supply Co., Ltd. A consulting engineer is to be engaged to advise the Council upon the question of transferring or retaining the control of the undertaking.

Thanington.—SUPPLY SOON.—The Parish Council has been informed by the Kent Electric Power Co., Ltd., that a supply of electricity will be available for the parish and district in about six weeks' time.

Torquay.—WIRING FOR COOKERS.—At the Corporation Electricity Committee the electrical engineer submitted a scheme for the hiring out of wiring for cookers, such work to be carried out, on behalf of the Corporation, by the electrical contractors on agreed terms. The scheme was adopted and it was decided to allocate £200 for the purpose.

Totnes (Devon).—REDUCED CHARGES.—The Town Council has approved the charges submitted by the Torquay electricity undertaking, which is taking over the Totnes undertaking. These charges comprise a flat rate of 8d. per kWh instead of the present charge of 10d., and a two-part tariff, under which the secondary charge will be 1½d. per kWh.

Wallsall.—NEW EQUIPMENT.—The Electric Supply Committee recommends the Town Council to provide mains, substations, and other equipment at a total cost of £11,000.

Warrington.—FRINGE ORDER.—The Electricity Committee has obtained a Fringe Order to supply premises in the Bucklow rural area.

LOAN.—The Electricity Committee has obtained sanction to borrow £20,000 for mains and services.

Traction

Barrow-in-Furness.—ELECTRIC VEHICLES TO BE PURCHASED.—The Health Committee has decided to purchase two electric vehicles for refuse collection at an estimated cost of £1,208.

Ipswich.—EXTENSIONS.—The Transport Committee has authorised further trolley-vehicle extensions at a cost of £7,500.

Newcastle-on-Tyne.—TROLLEY-BUSES.—The Transport and Electricity Committee is to seek the sanction of the City Council to introduce an experimental service of trolley-buses.

Russia.—A LARGE DIESEL-ELECTRIC LOCOMOTIVE.—The Krupp Co., of Essen, Germany, has recently completed a 1,650-h.p. Diesel-electric locomotive for use on the Soviet railway system in Central Asia. The motive power is supplied by two sets of 825-h.p. Sulzer-Diesel eight-cylinder engines direct coupled to the generators. The machine is provided with five driving axles, each being equipped with two motors. The machine, which has a length over the buffers of about 58½ ft. and weighs in running order approximately 149 tons, has been designed for a maximum speed of 37½ m.p.h.

South Africa.—TROLLEY-BUSES FOR DURBAN.—The Town Council has decided to install trolley-buses in replacement of tramways on the Point and Marine Parade routes. The following tenders were accepted: Sunbeam Motor Car Co., Ltd., Wolverhampton, eleven buses, costing £24,095; Leyland Motors (S.A.), Ltd., eleven buses at £25,001.

Traffic Signals.—LONDON DISTRICT.—The installation of signals near the Mansion House Station will cost £3,369, while a very intricate system in the Marylebone Borough Council's area will cost £30,000.

The Kingston-on-Thames Town Council is to have traffic signals installed at the junction of Eden Street and Clarence Street at an estimated cost of £555.

ONE-COLOUR SIGNALS RECOMMENDED.—The League of Nations' Committee on Road Traffic recommends in a recently published report that the one-colour system should be adopted for light signals. One colour only (red) is used in France; the three-colour system is used in Germany and Italy as well as in this country.

Communications

Australia.—RURAL AUTOMATIC TELEPHONE SERVICE.—Plans to extend automatic telephone services in rural parts of Australia have been announced by the Commonwealth Postmaster-General, who hopes to install about thirty such services within the next twelve months. At the same time, it is proposed to reduce by £1 the present annual minimum rental of £5 10s. paid by residential telephone subscribers in the metropolitan areas. This is estimated to involve an immediate loss of £35,000 a year if there is no increase in the use of the service.

Colombia.—TELEPHONE SERVICE WITH ENGLAND.—The Postmaster-General announces that telephone service is now available with Bogota and other principal towns in Colombia.

Czechoslovakia.—TELEPHONES AND TELEGRAPHS.—According to a recently issued Government return, there were 24,726 miles of telephone and 81,758 miles of telegraph lines in operation throughout Czechoslovakia at the beginning of 1933.

Great Britain.—POST OFFICE ACCOUNTS.—The Post Office commercial accounts for the year 1932-33 shows the following results:—

The annual deficit upon the Telegraph Service increased by £28,727 to £838,301. The number of inland telegrams decreased by 1,190,000 to 36,041,000, while overseas and ships' telegrams dropped by 1,358,000 to 9,448,000.

The yearly surplus from the telephones decreased by £162,327 to £409,521. The number of local calls rose by 55½ millions to 1,360½ millions. Inland trunk calls increased by 4,151,000 to 128,613,000, and international trunk calls declined by 156,000 to 2,364,000. During the year the net increase in exchanges was 187, in telephones 68,509, and in call offices 2,035.

The net capital investment was made up partly of £1,237,000 in lighting, heating, and power plant; £4,473,000 in telegraph plant, and £12,544 in offices; £113,028,000 in telephone plant, £5,303 in exchanges, £39,416 in call offices, and £2,137,100 in telephones. The mileage of wire represented investments of £1,190,740 in overhead, £9,528,521 in underground, and £17,664 in submarine circuits.

WIRELESS RELAY SYSTEMS.—The Wakefield Corporation has refused to grant permission to Wireless Relay Services, Ltd., to erect a pole at the junction of Eastmoor Road and Pinderfields Road.

The Heanor Urban District Council has sealed an agreement with the Padiham Wireless Relay Co., Ltd., for the distribution of wireless programmes in the district.

The Deptford Town Council has refused permission to the Universal Wireless Relay, Ltd., to place overhead wires in twenty-one streets in and around the Vale Ward.

The York Highways Committee recommends consenting to the assignment of their relay services by Messrs. Flowitt and Netherwood to a public company which is being formed.

RADIO INTERFERENCE AND LICENCES.—The ever-increasing popularity of broadcasting is reflected in the growth of the number of interference complaints which are investigated by the Post Office Engineering Department. During 1933 no fewer than 1,850 such cases were dealt with in the Birmingham telephone area, an increase of 425 on the previous year. In addition, 500 cases of the use of unlicensed receiving sets were investigated, convictions being obtained in 180 instances. Licences increased by 13 per cent. during the year to 174,200.

The masts and aerial system of the Marconi 10-kW broadcasting station recently opened at Milverton, 15 miles from Capetown. The masts are 300 ft. in height

In the North Wales district 660 cases of interference were investigated, namely, 150 in the Shrewsbury and Chester areas, 230 in Hanley, and 280 in Bangor.

In the West Yorkshire (Leeds) district the number of receiving licences totalled 93,172, an increase of 13,563 during 1933, while prosecutions increased by 34 to 75.

In Liverpool licences grew by 16,525 to 150,000, and fines were inflicted in most of the 120 prosecutions undertaken.

Greece.—TELEPHONIC COMMUNICATION.—Regular telephonic communication between Athens and the capitals of Central and Western Europe has recently been established *via* Salonika.

Iceland.—RADIO LISTENERS.—Practically 72 per cent. of the population of Iceland are radio listeners, says *The Wireless World*. The total number of registered listeners on December 31st last was 8,030, showing an increase of 2,612, or 48 per cent. in twelve months.

London.—TELEVISION.—The B.B.C. announces that it has become necessary to change the studio which is being used for television. It will take a week to dismantle and reinstall the apparatus, and therefore there will be no television transmissions on February 19th, 20th, 21st and 23rd. The first programme from the new studio will be transmitted on Monday, February 26th, at 11.0 p.m. A structure has been erected on the south tower of the Crystal Palace for experimental television transmission purposes. It will be recalled that the contract between the B.B.C. and the Baird Co. for 30-line transmissions expires on March 31st. Thereafter transmissions will be halved to two weekly and other systems may be tried. A new studio is to be equipped in premises adjacent to Broadcasting House.

North-East Coast.—TELEPHONE PROGRESS.—The annual report of the local P.T. and T. Advisory Committee shows that in the North-Eastern District, comprising parts of Durham, Yorkshire, Lincolnshire and Nottinghamshire, 7,158 new telephones were connected in 1933, a net increase of 2,008, making a total of 51,925. Residence rate subscribers numbered 11,829, and some 25,960 "stations" were operated automatically. During the year public call offices increased by seventy-four to 1,834, of which 579 are kiosks, while fifteen new exchanges were opened, eight of the rural automatic type and seven manual. Trunk calls numbered 4,919,760, and local and junction calls 23,651,000.

United States.—CONTROL OF COMMUNICATIONS.—The early enactment of a law providing for the creation of a Federal Communications Commission, with strict control over wireless, telephonic communication, telegraphs and cables, was decided on at a conference which took place at the White House on February 9th.

Wales.—BROADCASTING.—The Broadcasting Committee of the Council of the University of Wales has reopened the question of a broadcasting station exclusively for Wales, but the B.B.C. has produced technical data to show that, irrespective of the requirements of the West of England, the present transmitter at Washford Cross, in Somerset, actually serves a higher proportion of the population of Wales than could be served by a transmitter at any other site. A studio at Bangor will facilitate the relaying of programmes from North Wales, and the B.B.C. has also for some time past been considering the possibility of setting up low-powered relay transmitters in various parts of the country, including North Wales, which would otherwise be served only by the Daventry long-wave transmission.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Abertillery.—March 7th. Electricity Department. Overhead transmission lines. (See this issue.)

Argentina.—BUENOS AIRES.—February 21st. State Oilfields. Six three-phase, oil-immersed, outdoor-type transformers. (A.Y. 12193.)*

March 12th. Electrical equipment for operating three sluice valves. (A.Y. 12217.)*

Australia.—MELBOURNE.—Post and Telegraph Department. March 13th. Various insulated wires. (A.Y. 12172.)*

March 20th. Telephone protective apparatus of various types. (A.Y. 12186.)*

Bell sets and portable telephones. (A.Y. 12169.)*

March 27th. 150-600 miles of twin 0.048 in. rubber-insulated, braided telephone wire. (A.Y. 12194.)*

City Council. March 12th. Totally enclosed metal-clad switchgear. (A.Y. 12170.)*

March 26th. Supply of three-phase, 6,600-V, metal-clad switchgear, suitable for rupturing 250,000 kVA. (A.Y. 12185.)*

February 26th. City Council Electricity Department. Oscillograph equipment consisting of three vibrators, together with optical viewing and recording accessories. (A.Y. 12191.)*

BRISBANE.—City Council. March 2nd. Two 11,000-V 3-phase metal-clad switchboards. (A.Y. 12184.)*

PERTH.—April 19th. Western Australian Government Electricity Supply. Boiler house equipment, one 25,000-kW turbo-alternator and e.h.p. and l.p. switchgear. (February 2nd.)

Aylesbury.—February 21st. Electricity Department. Materials for twelve months from April 1st, 1934. (February 9th.)

Belgium.—BRUSSELS.—February 23rd. Municipality. Supply and installation of a 20,000-kW steam turbo-generator. Particulars and plant (125 fr.) from 11, Rue Ste. Catherine.

IXELLES (BRUSSELS).—February 22nd. Supply of 270 d.c. electricity meters. Particulars from Service de l'Electricité, 20, Rue Alsace-Lorraine.

ANTWERP.—March 13th. Supply and installation of a mercury vapour rectifier on the Quai Cockerill. Particulars (5 fr.).

Bexley.—February 27th. U.D.C. Transformers, two on-load tap-changing equipments and switchgear kiosks. (February 9th.)

Blackburn.—February 26th. Electricity Committee. Cable, rubber-insulated wire and consumers' meters for twelve months. (January 19th.)

Cholsey (BERKS).—March 10th. Berks Mental Hospital Committee. Electric lighting and accessory works, &c., at the new villa for females. (See this issue.)

Cleethorpes.—March 6th. Urban District Council. Transformers, switchgear and mains stores. (February 9th.)

Dover.—March 5th. Corporation. Meters, transformers, and cable for twelve months ending March 31st, 1935. (See this issue.)

Eastbourne.—February 19th. Electricity Department. 500 electric cookers. (February 9th.)

Edinburgh.—March 8th. Electricity Department. Materials for year ending May 28th, 1935. (See this issue.)

Erith.—March 7th. Electricity Department. Electrical materials for the year ending March 31st, 1935. (See this issue.)

Galloway.—February 26th. Galloway Water Power Co. Contract No. 23. Work at Doon-Deugh tunnels, including intake works at Loch Doon, &c. Specifications, &c., from Sir A. Gibb & Partners, Queen Anne's Lodge, S.W.1 (£10 10s.); tenders to T. Lawrie, Galloway Water Power Co., Queen's House, Kingsway, W.C.2.

Harrogate.—February 24th. Electricity Department. Stores for twelve months commencing April 1st, 1934. (January 26th.)

Hastings.—February 20th. Electricity Department. Various materials for the year ending March 31st, 1935. (January 26th.)

February 27th. Switchgear, cable tiles, concrete covers, copper wire, &c., for twelve months ending March 31st, 1935. (February 2nd.)

Hull.—March 27th. Telephone Committee. Automatic telephone exchange. (February 9th.)

India.—TRAVANCORE.—May 7th. Government Electricity Department. Turbines, generators, switchgear, transformers, &c., for the Pallivasol hydro-electric scheme. (February 9th.)

NEW DELHI.—March 5th. Stores Department. Lead-sheathed v.i.r. cables. (A.Y. 12210.)*

Kettering.—February 26th. Electricity Department. E.h.p. and l.p. underground cables for the year ending March 31st, 1935. (February 9th.)

Kincardine-on-Forth.—February 19th. Bridge Joint Committee. Various works, including electric lighting, in thirty houses. Specifications from J. Fraser & Son, 3, Randolph Street, Dunfermline; tenders to J. M. Mitchell, County Clerk, County Buildings, Cupar.

London.—HAMMERSMITH.—February 28th. General electrical stores, &c., for twelve months. (January 19th.)

STOKE NEWINGTON.—February 23rd. Electricity Department. Meters and l.p. cable (annual contract). (February 2nd.)

Manchester.—February 23rd. Electricity Committee. Two complete water-tube boiler units and 33-kV and 6.6-kV switchgear. (February 2nd.)

February 23rd. Corporation. 33-kV switchgear, two 25,000-kVA, one 6,000-kVA and two 5,000-kVA transformers for various sub-stations. (February 9th.)

February 28th. Cooling towers for Stuart Street power station. (February 9th.)

Milford.—February 28th. Electricity Department. Materials for twelve months ending March 31st, 1935. (February 9th.)

New Zealand.—WELLINGTON.—Posts and Telegraph Department. March 13th. 3,000 four-conductor telephone cords. (A.Y. 12149.)*

March 14th. Telephone instrument cords. (A.Y. 12177.)* 2,640 ft. of v.i.r. telephone cable. (A.Y. 12178.)*

March 15th. Twenty-six 2-V 130-Ah cells. (A.Y. 12152.)*

April 18th. 1,000 switchboard plugs and 2,500 24-V switchboard lamps. (A.Y. 12218.)*

March 27th. Public Works Tenders Board. One set each of 110-kV and 33-kV outdoor switching equipment and steelwork for these. (A.Y. 12180.)*

Public Works Department. April 24th. Four mimic bus panels to control four 110-kV oil circuit-breakers. (A.Y. 12176.)*

Northern Ireland.—BELFAST.—March 5th. Electricity Board. 33-kV and 11-kV overhead transmission lines, new l.p. distribution systems, and reconstruction of existing l.p. systems. (January 26th.)

Peterborough.—February 22nd. Electricity Department. 6.6-kV switchboard and cubicle. (See this issue.)

Runwell (ESSEX).—February 28th. East Ham and Southend-on-Sea Joint Visiting Committee. Electrical installation at Mental Hospital. (December 22nd.)

Salford.—Electricity Department. February 21st. Electrical stores. (February 2nd.)

February 21st. Cable tiles and cable covers. (February 9th.)

South Africa.—PRETORIA.—March 2nd. City Council. Turbo-alternator, condensing plant and auxiliaries, boilers and electrically operated crane. (December 22nd.)

JOHANNESBURG.—Railways and Harbours. March 26th. Six electric capstans for Port Elizabeth harbour. (A.Y. 12221.)*

Stoke-on-Trent.—March 7th. Electrical Engineer's Department. Meters, mains and cables for one year. (See this issue.)

March 12th. N.W. Midlands J.E.A. Transformers, e.h.p. and l.p. overhead transmission lines. (February 9th.)

Swansea.—February 16th. Stores for twelve months from April 1st, 1934. (January 26th.)

Uruguay.—MONTEVIDEO.—March 21st. State Electricity Supply and Telephone Administration. H.p. and l.p. and telephone armoured cables. (A.Y. 12189.)*

April 2nd. 10,000 Delta porcelain insulators for overhead transmission lines. (A.Y. 12227.)*

Worcester.—February 17th. Electricity Department. Meters, cables, transformers, &c., for twelve months ending March 31st, 1935. (February 2nd.)

---

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Barrow-in-Furness.—Electricity Committee. Accepted. Six electric cookers each.—English Electric Co., Ltd.; Revo Electric Co., Ltd.; Simplex Electric Co., Ltd.; British Electric Transformer Co., Ltd.

Birkenhead.—Electricity Committee. Accepted. Wiring houses under the assisted scheme: Sixty (£257).—L. W. Bryan. Forty-nine (£220).—Economic Electric Co., Ltd.—Eighteen (£76).—Park Electric Co.

Bradford.—Electricity Committee. Recommended. Two 500-kVA three-phase oil-cooled transformers.—Electric Construction Co., Ltd. Supply of three-phase oil-cooled transformers for twelve months ending March 31st, 1935.—English Electric Co., Ltd.

Cardiff.—Libraries Committee. Accepted. Automatic telephones at Central Library (£158).—Siemens Bros. & Co., Ltd.

Electricity Committee. Accepted. Two 2,000-kVA transformers (£940).—Fuller Electrical Manufacturing Co., Ltd. Switchgear (£402).—A. Reyrolle & Co., Ltd. Two switch panels (£391), and one switchboard (£802).—G. Ellison, Ltd.

Chesterfield.—Electricity Committee. Accepted. Cables for miscellaneous extensions (£755).—Macintosh Cable Co.

Dover.—Town Council. Accepted. Replacing apparatus on consumers' premises at Kearsney, Temple Ewell, &c., in connection with the change-over (£190).—Crompton Parkinson, Ltd.

Eccles.—Electricity Committee. Accepted. Cables: contract extensions for twelve months.—British Insulated Cables, Ltd.; Callender's Cable & Construction Co., Ltd.

Gravesend.—Electricity Committee. Recommended. Kiosk with Yorkshire Electric transformer (£798).—Standard Switchgear Co.

Hastings.—Electricity Committee. Recommended. Six kiosks (£1,070).—Crompton Parkinson, Ltd.

Ipswich.—Transport Committee. Recommended. Six trolley vehicles (£10,365).—Ransomes, Sims & Jefferies, Ltd.

Kidderminster.—Housing Committee. Accepted. Wiring twenty houses on Broadwaters estate (£59).—B. French.

Liverpool.—Electric Power and Lighting Committee. Recommended.—One isolating unit, one feeder unit and one coupler for the Harrington Street sub-station (£3,742). Two isolating switch units, two feeder units, two transformer units and one coupler for the Bolton Street sub-station (£9,637).—Ferguson Pailin, Ltd. Two 12,500-kVA transformers with tap-changing gear for the Bolton Street sub-station (£7,966).—Ferranti, Ltd.

London.—L.C.C.—Central Public Health Committee. Installation of automatic cold storage plants at six hospitals (£2,489).—J. & E. Hall, Ltd. Electrical installation in new operating theatre, X-ray block and sanitary annexe at Highgate Archway Hospital (£351).—Electrical Installations, Ltd. Installation of electric fire alarm system at Highgate Hospital (£286).—Read & Partners, Ltd. Renewal of main cables at St. Leonard's Hospital, Shoreditch (£393).—G. E. Taylor & Co.

Manchester.—Transport Committee. Accepted. One mercury-arc rectifier equipment for the Hyde Road Car Works.—Electric Construction Co., Ltd.

Electricity Committee. Accepted. Cookers (twelve months' requirements).—Carron Company; Simplex Electric Co., Ltd.: and British National Electrics, Ltd.

Reigate.—Town Council. Accepted. Installation of an automatic internal telephone system.—Siemens Bros. & Co., Ltd.

St. Manance (FIFE).—Town Council. Accepted. Installation of electrical fittings in houses (£194).—Moncrieff, Leven.

Southport.—Education Committee. Accepted. Electric lighting at Norwood Road school (£180).—Brooks & Southworth.

Sunderland.—Management Committee of the Sunderland Royal Infirmary. Accepted. Equipment of the X-ray block in the new radiological department.—A. E. Dean & Co.

Tunbridge Wells.—Town Council. Accepted. Installation of traffic signals at Upper Grosvenor Road and Grosvenor Bridge (£379).—Automatic Electric Co., Ltd.

Forthcoming Events

Institution of Chemical Engineers.—Friday, February 16th. Hotel Victoria, London. 11 a.m. Annual meeting. 7 for 7.30 p.m. Annual Dinner.

Institute of Transport.—Friday, February 16th. Connaught Rooms, W.C.2. 6.30 for 7 p.m. Annual Dinner.

Association of Supervising Electrical Engineers.—Saturday February 17th. Trocadero, W.1. 6.30 p.m. Annual Dinner. Tuesday, February 20th. 2, Savoy Hill, W.C.2. 7.15 p.m. "Photo Electric Cells." Mr. H. R. Ruff.

Illuminating Engineering Society.—Tuesday, February 20th. Hall of the Institution of Mechanical Engineers, London. 7 p.m. "Heterochromatic Photometry." Mr. H. Buckley.

Overhead Lines Association.—Wednesday, February 21st. Institution of Electrical Engineers, London. 5.30 p.m. "New Electricity Regulations and their effect on Rural Electrical Development." Mr. W. Fennell.

Institution of Electrical Engineers.—Thursday, February 22nd. Institution, London. 6 p.m. "Safety Measures in X-Ray Work, including High-Voltage Flexible Cables." Mr. L. G. H. Sarsfield. (*North-Eastern Students' Section*).—Friday, February 16th. Armstrong College, Newcastle-on-Tyne. 7.15 p.m. "Tapping the High-Tension Grid." Mr. T. D. Oswald. Wednesday, February 21st. County Hotel, Newcastle-on-Tyne. 7.30 p.m. Annual Dinner. (*Western Centre*).—Monday, February 19th. Bristol University, Bristol. 6 p.m. "Control and Protection, with particular reference to developments during the last seven years." Mr. H. W. Clothier. (*Tees-Side Sub-Centre*).—Monday, February 19th. Cleveland Technical Institute, Middlesbrough. 7 p.m. "The Application of Automatic Voltage and Switch Control to Electrical Distribution Systems." Messrs. W. Kidd and J. L. Carr. (*Dundee Sub-Centre*).—Tuesday, February 20th. Kidd's Restaurant, Dundee. Informal Discussion. (*North Midland Centre*).—Tuesday, February 20th. Hotel Metropole, Leeds. 7 p.m. "The Application of Automatic Voltage and Switch Control to Electrical Distribution Systems." Messrs. W. Kidd and J. L. Carr. (*North-Western Students' Section*).—Tuesday, February 20th. Engineers' Club, Manchester. 7.15 p.m. Smoking Concert. (*London Students' Section*).—Wednesday, February 21st. 1.15 p.m. Visit to Broadcasting House. (*South Midland Centre*).—Wednesday, February 21st. Midland Institute, Birmingham. 6 p.m. Joint meeting with the Institutions of Civil and Mechanical Engineers. "The Effective Use of Coal." Professor R. V. Wheeler. (*South Midland Students' Section*).—Wednesday, February 21st. 3 p.m. Visit to works of The British Thomson-Houston Co., Ltd., Coventry. 7 p.m. Joint meeting with the Rugby Engineering Society at Benn Buildings, Rugby. "The Induction Voltage Regulator and Its Control Gear." Mr. R. P. E. Tabb. Saturday, February 24th. 4.30 p.m. Visit to the British Industries Fair, Birmingham. (*West Wales* (*Swansea*) *Sub-Centre*).—Thursday, February 22nd. Electric House, Swansea. 6 p.m. "Some Aspects of the Electrical Transmission of Power by means of Direct Current at Very High Voltages." Mr. H. Rissik.

Ilford Electrical Contractors' Association.—Thursday, February 22nd. Town Hall, Ilford. 7 p.m. Annual Dinner and Dance.

Birmingham Electric Club.—Friday, February 23rd. Grand Hotel, Birmingham. 7 p.m. "Modern Electric Resistance Furnaces." Mr. A. Glynne Lobley.

Institute of Marine Engineers.—Friday, February 23rd. Grosvenor House, W.1. 7 p.m. Annual Dinner.

Junior Institution of Engineers.—Friday, February 23rd. Institution, London. 7 p.m. Lecture, "Some Modern Improvements in Electrical Instruments." Mr. G. F. Shotter.

Institution of Mechanical Engineers.—Saturday, February 24th. Visit to Barking Power Station.

Makers' Names Wanted

MACDONALD medical sterilisers.
STOODY grinder.
HALA radiant heat lamp.

Notes

Generation of Electricity in January

The official returns rendered to the Electricity Commissioners show that 1,536 million kWh was generated by authorised undertakers in Great Britain during the month of January, 1934, as compared with the revised figure of 1,338 million kWh in the corresponding month of 1933, representing an increase of 198 million kWh, or 14.8 per cent. The number of working days in the month (*i.e.*, excluding Sundays) was twenty-seven as against twenty-six last year.

The Illuminating Engineering Society

The 242 members and guests of the Illuminating Engineering Society who gathered at the Trocadero, London, W., on Tuesday, under the presidency of Mr. C. W. Sully, constituted the largest gathering in the history of that body. The president, responding to the toast of "The Society," which had been proposed by Mr. H. W. Archer (editor, *Manchester Evening News*), announced that the date was very nearly that on which the Society had been founded twenty-five years ago; deducting the four years of the war when darkness was compulsory the occasion could be regarded as its coming of age. Its membership included men from two competing industries, but in the science of good lighting their studies were of common benefit.

The toast of "The Guests" was proposed by Mr. Percy Good (hon. treasurer), who made a humorous reference to the possibility of combining electricity, gas, and water grids in an underground triple-concentric main. Sir Maurice E. Webb (vice-president R.I.B.A.), said that floodlighting showed up the defects of many buildings. Some tall buildings designed to have their architectural points illuminated by the sun from above possibly looked better when floodlighted from below.

The dinner was followed by a dance.

New Copper Alloys

A discovery of considerable importance to users of non-ferrous metals is reported from the research laboratories of I.C.I. Metals, Ltd., Birmingham, as a result of which it seems likely that a whole series of new copper alloys may be developed. Among other characteristics, these new alloys possess the exceptional property of being hardened and strengthened very materially by suitable heat treatment. They are therefore in this respect almost a metallurgical curiosity.

The Calorific Value of Fuel

Arising out of a resolution made at the London Fuel Conference in 1928, consideration is being given by the International Standards Association to the setting up of standards dealing with the definition of "gross" and "net" calorific values of solid, liquid and gaseous fuels. The British Standards Institution has issued its recommendations as a British Standard (No. 526), 1s. 2d. post free, B.S.I., 28, Victoria Street, S.W.1. For solid and liquid fuels the gross calorific value at constant volume is the number of B.th.u. liberated when one pound of the fuel is burned at constant volume in oxygen saturated with water vapour, the original and final materials being at 60 deg. F., the residual products CO_2, SO_2, N, and H_2O, and the water (other than that originally present as vapour) in the liquid state. The gross calorific value at constant pressure is obtained in a similar way except that air is substituted for oxygen.

The net calorific value at constant volume and pressure differs from the corresponding gross values in that water in the residual products appears as vapour only. The net calorific value is increased by the gross value less the latent heat (reckoned at 1,055 B.th.u. per lb.) of the water condensed from the products of combustion by cooling to 60 deg. F. It is assumed that the whole of the hydrogen in the first has been burned to water and that the percentage of hydrogen in the fuel is known. Gross and net calorific values of gaseous fuels are also defined.

E.P.E.A. (London Technical Group)

The annual dinner and dance of the London Technical Group of the Electrical Power Engineers' Association will be held at the Café Royal, Regent Street, W., on March 3rd. Tickets (15s. each, exclusive of wines but including buffet) can be obtained from Mr. W. F. Andrews, Hon. Secretary, 14, Violet Road, E.3.

"Measuring High Resistances"

The second and third lines of the second paragraph of the article under this heading in our issue of January 26th (p. 112) should have read: "(1) The voltage across the voltmeter is in quadrature with that across the resistance on test."

Appointments Vacant

Showroom manager for Cardiff Electricity Department.

Probationary assistant engineers for the Post Office Engineering Department.

Lady demonstrator for Tunbridge Wells Electricity Department.

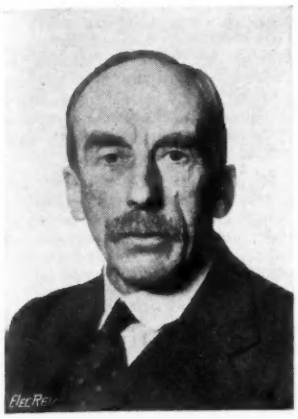
Technical assistant for Dorchester Electricity Department.

(See our classified advertisements.)

Our Personal Column

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements

Mr. F. M. Chapman, for many years manager of the Ironclad Switchgear & Measuring Instruments Department of the General Electric Co., Ltd., has just retired. Mr. Chapman's service with the G.E.C. dates back to 1888, when he went as a pupil to the Homerton works. From Homerton he was transferred after sixteen months' service to the Chapel Street works of the company at Salford, and about a year later he was appointed chief assistant in the department concerned with the manufacture of electric lighting switches and accessories. His promotion to manager of the department followed early in 1892, and he occupied that position until the works were destroyed by fire in 1895. In 1912 Mr. Chapman was appointed manager of the Electric Light Supplies Department, which at that time embraced switchgear and instruments, in London. After the war the department was reconstructed, the electric light supplies section being separated from switchgear and instruments. Mr. Chapman continued to supervise the latter, known as the M.X.Y. Department, until his retirement. He maintained, however, close touch with the numerous interests of the E.L.S. Dept., and for a period of twenty years represented that department on many B.S.I. Committees, as well as on the B.E.A.M.A. Accessories Technical Committee.



Mr. F. M. Chapman

Mr. Chapman was entertained recently at a luncheon over which Sir Hugo Hirst, Bt., chairman of the G.E.C., presided. Mr. M. J. Railing, joint managing director, was unable to be present owing to absence abroad. In proposing Mr. Chapman's health Sir Hugo said that he was very much a pivotal man in those early manufacturing days when no standards of design, &c., existed in the industry. He applied himself to designing all sorts of electrical accessories which are to-day commonplace, but which then represented unsolved problems. Sir Hugo presented Mr. Chapman with a silver rose bowl from himself and Mr. M. J. Railing, and with a silver salver engraved with the names of the colleagues who had contributed to that expression of their respect and affection.

Mr. E. E. F. Reeves, a director of the Electric Supply Corporation, Ltd., has been appointed to fill the vacancy on the board of the Hendon Electric Supply Co., Ltd., caused by the death of Mr. J. G. B. Stone.

Mr. K. A. Scott-Moncrieff has been elected chairman of the Electric Supply Corporation, Ltd., and chairman of the Cawnpore Electric Supply Corporation, Ltd., in succession to the late Mr. J. G. B. Stone. Mr. Scott-Moncrieff is well known in the electrical world, being already chairman of the Delhi Electric Supply & Traction Co., Ltd., and a director of several other electrical concerns here and overseas.

[Elliott & Fry

Mr. K. A. Scott-Moncrieff

Mr. G. W. Moore, chairman of the Automatic Electric Co., Ltd., has left on a visit to South Africa, where his company has been busy for some time installing automatic telephones for the Union public telephone service.

Sir Geoffrey R. Clarke has been appointed chairman of the Calcutta Tramways Co., Ltd., in succession to the late Mr. J. G. B. Stone. Sir Geoffrey is managing director of the Telegraph Construction & Maintenance Co., Ltd. **Mr. C. O. Webb,** chairman of the Burma Electric Supply Co., Ltd., has been appointed a director.

An E.D.A. Competition.—The prize-winners in the recent E.D.A. Electric Kitchen Design Competition are as follows: Class I (house valued at £300-£400): First prize (£50), Mr. A. L. Osborne; second prize (£25), Mr. H. Pittaway. In the opinion of the assessors, the two winning designs for Class II (house valued at £800-£900) were of equal merit, and it was therefore decided to award the prize money equally in the form of joint premiums to Messrs. L. J. Couves & Partners and Mr. J. M. Clarke. A kitchen, specially built and equipped according to the winning design (Class I), will be exhibited at the Building Centre from February 26th to March 26th, and during the same period there will be a special display of other electrical equipment for kitchens.

Mr. H. MacMillan, M.P., a director of Messrs. MacMillan & Co., Ltd., the Great Western Railway, and the Monotype Corporation, Ltd., has accepted the office of president of the Institute of Industrial Administration.

Sir Tom Callender has decided, owing to his recent illness and on the recommendation of his medical advisers, not to submit himself for re-election to the board of the Yorkshire Electric Power Co.

Mr. A. E. Cuthbert has been appointed technical sales representative for the whole of Scotland for Messrs. Drake & Gorham, Ltd., for their range of e.h.p. and l.p. switchgear. He will continue to represent Messrs. Edward Holme & Co., Ltd., of Altrincham, for contactor gear, &c. Mr. Cuthbert's address is 175, George Street, Glasgow.

Mr. J. E. Calverley, who opened the discussion at the informal meeting of the I.E.E. on "The Future Trend of Grid Controlled Rectifiers" reported on page 241

The accompanying portrait of **Miss Caroline Haslett,** C.B.E., director of the Electrical Association for Women, is reproduced from a painting by Dorothy E. Vicaji, which was presented to the Association on February 12th by Margaret Lady Moir to mark the completion of her three years of office as president of the Association.

Miss C. Haslett (from a portrait by Dorothy Vicaji)

Mr. W. G. Marks, whose appointment as manager of the Liverpool Corporation transport undertaking was recorded in our issue of December 15th, will take up his duties on March 7th, and he has received an inscribed gold cigarette case from the staff of the Nottingham Transport Department as a farewell token.

Mr. J. Austin Baker, tramways manager to the South Shields Corporation, who was censured recently and was to have his salary reduced by £50 per annum, following allegations of mismanagement of affairs in his department, has given three months' notice terminating his engagement.

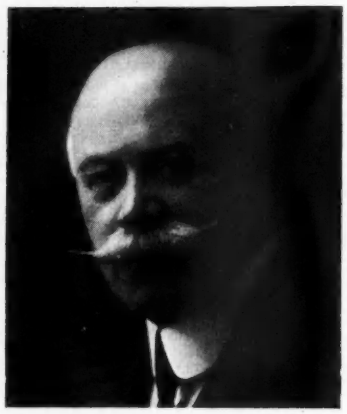
Mr. J. Gray has been appointed chairman of the Madras Electric Supply Corporation, Ltd., in succession to the late Mr. J. G. B. Stone. **Mr. W. R. Elston,** secretary, has been elected to the board, and **Mr. H. Pryor** has been appointed secretary.

Obituary

Mr. A. V. Hawkins, C.I.E., traffic manager for the Calcutta Tramways Co., Ltd., has died at Bombay. He had been ill for some time and was proceeding to Europe for the winter, but was unable to go farther than Bombay. Mr. Hawkins had a long period of service with the Indian Railways, and became deputy traffic manager of the Eastern Bengal Railway. He retired from the railways and became traffic manager of the Calcutta tramwa

Mr. E. W. Wilkie.—The death has taken place, at his home at Monkseaton (Northumberland), at the age of sixty, of Mr. E. W. Wilkie, assistant superintendent engineer to the Post Office Engineering Department. He joined the Post Office staff as an engineer thirty-four years ago, and in 1914 helped in the installation of one of the first automatic exchanges in Darlington.

Mr. A. Lucas.—We regret to announce the death of Mr. Alfred Lucas, which occurred at his home in Sheffield on February 6th. Mr. Lucas, who was in his seventieth year, was well known in engineering circles in the North of England, and for over thirty-three years was manager of the Sheffield district office of the British Thomson-Houston Co., Ltd., from which position he retired a year ago. Mr. Lucas received his early training at Barnsley, where he commenced his career with a firm of ironmongers. Later, he returned to Sheffield and entered the service of Tasker, Sons & Co., electrical engineers, with whom he remained fourteen years. During this period he helped to carry out many of the early electric lighting and telephone installations in Sheffield. As assistant manager of the firm, the first Sheffield electricity works was built under his supervision. When the Sheffield Electric Light & Power Co. was taken over by the Corporation in 1897 Mr. Lucas went with it as superintendent of mains under the Electric Lighting Committee. Early in 1899 he became Sheffield district manager for the B.T.-H. Co. at a time when the Sheffield tramways were being converted from horse to electric traction, and the B.T.-H. Co. had obtained the contract for the electrical equipment of the service. He was the company's first Sheffield representative. Mr. Lucas had numerous social activities, and was a member of the Midland Institute of Mining Engineers.



The late Mr. A. Lucas

Mr. L. H. Quin.—We regret to record the death of Mr. Lawrence Howard Quin, of the *Metal Bulletin* and the Metal Information Bureau. Mr. Quin, who was sixty-six years of age and died last Saturday at his residence at West Norwood, specialised in the trade journalism of the metal industries during the greater part of his career. Right down to the last he contributed special articles on these subjects to the ELECTRICAL REVIEW, for a contribution on "Materials for the Electrical Industry," showing the course of markets in 1933, appeared in our issue of January 5th (p. 21).

Mr. C. W. D. Bourne.—The death occurred on February 9th of Mr. C. W. D. Bourne, one of the founders and the managing director of Messrs. Whipp & Bourne, Ltd., electrical engineers, of Castleton, Rochdale. He was also a director of the Castleton Electric Co., Ltd., which was formed in 1920 to acquire all the issued shares of Whipp & Bourne, Ltd.

Will.—Mr. J. A. Rudd, M.I.E.E., M.I.M.E., of Nitshill, Renfrewshire, and of Glasgow, left personal estate of £24,408.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

H.M.V. Household Appliances, Ltd.—Private company. Registered February 5th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of and wholesale and retail dealers in household and domestic appliances and apparatus, refrigerators, washing machines, electric heaters, electric and other cookers, food-mixers, gramophone and radio apparatus, &c. The subscribers are: G. N. Barrier, 32, Swinburne Road, Roehampton, S.W.15; and W. C. Waterlow, 16, Sherwood Road, South Harrow, Middlesex. The first directors are to be appointed by the subscribers. Solicitors: Broad & Son, 1, Great Winchester Street, E.C.2.

Lennox Electric Co., Ltd.—Private company. Registered February 6th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of wireless apparatus of all kinds, accumulators, batteries, microphones, &c. The subscribers are: E. N. Armstrong, 4, St. James's Square, W.11; and B. P. Hare, 40, Chancery Lane, W.C.2. Registered office: 12, Station Road, Wood Green, N.22.

Cooper-Bell Engineering Co., Ltd.—Private company. Registered February 7th. Capital, £1,000 in £1 shares. Objects: To acquire the business of electrical and mechanical engineers and contractors now carried on by J. L. H. Cooper and A. Bell, as the "Southern Electrical Co." at Shoreham-by-Sea, Sussex. The first directors are: J. L. H. Cooper, 6, Grand Avenue, Lancing, Sussex; A. Bell, 9, Seventh Avenue, Lancing, Sussex; and G. W. Allen, Meadfoot, Broad Street, Cuckfield, Sussex. Registered office: 11a, Station Road, Portslade-by-Sea, Sussex.

Day & Co. (Electrical Contractors), Ltd.—Private company. Registered February 7th. Capital, £500 in £1 shares. Objects: To acquire the business of electric lamp and fancy goods dealers and electrical contractors carried on by Ethel J. Day and Agnes Daly, as Day & Co., at 19, Rathbone Place, W.1. The life directors are: Mrs. E. J. Day (managing director), Flat 31, 29, Abercorn Place, W.; and Agnes Daly, 2, Petherton Road, Highbury, N.5. Secretary: Agnes Daly. Registered office: 19, Rathbone Place, W.1.

Southport Hire Purchase Finance Corporation, Ltd.—Private company. Registered February 7th. Capital, £500 in £100 shares. Objects: To carry on the business of hire purchase financiers, particularly in connection with wireless and electrical appliances and fittings, musical instruments, domestic appliances, &c. The subscribers are: S. Hadfield, 30, Westcliff Road, Birkdale; and B. Bramall, 71, Promenade, Southport. Secretary: B. Bramall.

D. W. Thompson, Ltd.—Private company. Registered February 8th. Capital: £500 in 10s. shares. Objects: To carry on the business of agents for and dealers in wireless transmitting and receiving apparatus, electrical storage batteries and electrical apparatus, gramophones, &c. The permanent directors are: A. J. Christie, Langley Cottage, Fulmer, Bucks, and D. W. J. Thompson, Rosslare, Stanley Hill Avenue, Amersham, Bucks.

J. & N. Wade, Ltd.—Private company. Registered February 8th. Capital: £2,000 in £1 shares (400 25 per cent. cumulative preference and 1,600 ordinary). Objects: To acquire the business of factors and dealers of electrical accessories carried on by J. & N. Wade at "Tynedale," Battenburg Avenue, Portsmouth, Hants. The first directors are: J. Wade (managing director), and Mrs. J. Wade, both of 150, Kensington Road, Portsmouth.

Instanta Electric Signal Clocks, Ltd.—Private company. Registered February 9th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electric signal clocks, &c. The first directors are: H. R. Thompson (permanent), 140, East Dulwich Grove, S.E.22; G. C. H. Clayton, 158, Grove Lane, Camberwell, S.E.5; E. L. Thompson, 6, Rye Hill Park, Peckham, S.E.15. Registered office: Mercantile and Textile Exchange, 1-3, St. Paul's Churchyard, E.C.4.

Returns of Electrical Companies

Northampton Electric Light and Power Co., Ltd.—Particulars have been filed of debenture stock to secure £500,000, authorised December 14th, 1933, and covered by trust deed dated January 16th, 1934, charged on the company's undertaking and property, present and future, including uncalled capital (subject to the existing charges to secure the company's 5 per cent. debenture stock so long as, and to the extent to which, such charges are still subsisting). The amount of the present issue is £450,000. Trustees: Royal Exchange Assurance. (The stock was offered to the 5 per cent. debenture stock holders for conversion or subscription in cash at 96 per cent., and a commission of £4,875 was paid to the company's brokers for agreeing to purchase at 96 per cent. any stock not taken up as above.)

Edmundson's Electricity Corporation, Ltd.—Satisfaction in full on or before December 21st, 1933, of trust deed dated October 7th, 1930, and registered October 13th, 1930, has been registered. (According to the register of mortgages, the trust deed registered October 13th, 1930, originally secured £1,000,000 debenture stock with power to issue further stock not exceeding half the paid-up share capital.)

Lighthouse Electrical Co., Ltd.—Satisfaction in full on January 29th, 1934, of debenture dated May 18th, 1932, and registered May 26th, 1932. (According to the register of mortgages, the debenture registered May 26th, 1932, originally secured all moneys due to bank.)

Dynameg, Ltd.—Debenture, dated January 20th, 1934, to secure £846, charged on the company's property, present and future, including uncalled capital. Holders: R. Tilley, "Churston," Howe Lane, Kinnon, Bournemouth.

Violite (1933), Ltd.—Second debenture, dated January 15th, 1934, to secure £1,500, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: J. Metcalfe, 112, Widmore Road, Bromley.

Collins Brown & Co., Ltd.—Issue on December 15th, 1933, of a debenture for £100, part of a series already registered. (This debenture was included in the particulars filed December 18th, 1933, as being issued on December 14th, 1933.)

Clang, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated January 27th, 1934, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Francis Bell & Co., Ltd.—Particulars filed of £1,300 debentures authorised January 29th, 1934, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

Eons Electrical Co., Ltd.—W. H. Brown, 19a, Coleman Street, E.C.2, was appointed receiver and manager on January 31st, 1934, under powers contained in debenture dated July 30th, 1930.

City Notes

The London Power Co., Ltd., reports a net revenue for 1933 of £1,125,663, as compared with £1,017,999 for 1932, to which is added £2,212 received as interest, &c., and £37,256 transferred from reserve to meet a deficiency in the amount charged to constituent companies for electricity supplied. £40,000 is placed to reserve, and a dividend of 6 per cent. is paid. The output of the stations increased from 963,405,452 to 1,127,726,874 kWh, of which 148,000,000 kWh was supplied to the Central Electricity Board under temporary supply agreements. The effective plant capacity available at the end of the year was 494,000 kW.

Presiding at the annual meeting on February 9th, Sir Francis Fladgate (chairman) said that the first part of the new Battersea power station had been completed and was in commercial operation. The consent of the Electricity Commissioners had been received for the installation of a further 100,000-kW set, the manufacture of which was now in hand. Capital expenditure had amounted to a little over a million pounds. The average cost per kWh of generation for 1933, as compared with 1932, showed a decrease of 10 per cent., some portion of this being due to the decrease in the price of coal owing to the greater use of the riverside stations.

The London Electric Supply Corporation, Ltd., reports a profit for 1933 of £104,418, as compared with £97,806 in the preceding year, to which is added £61,332 brought in and interest from investments, &c., making £184,754. It is proposed to pay a final ordinary dividend of 4 per cent., maintaining the distribution for the year at 7 per cent., to transfer £16,177 to reserve, and to carry forward £65,437. The sales of electricity totalled 313,897,159 kWh, as against 293,480,406 kWh in 1932. Standard prices under the London Electricity (No. 2) Act, 1925, to operate as from January 1st, 1932, have now been determined by the Electricity Commissioners. Following the annual meeting on March 6th, an extraordinary meeting will be held at which a resolution will be submitted amending the articles of association so that they may "conform with modern usage and satisfy the requirements of recent legislation."

The Yorkshire Electric Power Co. reports a net profit for 1933 of £439,665, as compared with £372,774, which with £80,428 brought in makes £520,093. It is proposed to pay a final dividend of 5 per cent. on the ordinary stock, making 8 per cent. for the year, to allocate £150,000 to depreciation and reserve, £35,000 to plant renewals fund, and £30,000 for the establishment of an employés' pension fund. A balance of £82,058 is carried forward. The report states that the sales of electricity increased from 215,156,631 kWh in 1932 to 235,902,400 kWh in 1933, and in addition 143,704,843 kWh was supplied to the Central Electricity Board. The recent improvement in trade and manufacture has resulted in an increased demand for electricity, particularly by the textile trades and general power users. There have been further increases in the supplies in bulk to authorised undertakers and new agreements have been entered into with the Bingley U.D.C. and the Dearne District Electricity Board. In Lincolnshire temporary provision has been made for a bulk supply to Barton-upon-Humber and the construction of the necessary system of mains and sub-stations is proceeding for the supply in the area under the North Lincolnshire and Howdenshire Electricity Special Order. In December last a supply of electricity was made available to consumers for the first time in Lincolnshire at Winterton and Brigg. It is proposed to contribute £5,000 (less tax), payable over a period of seven years, towards the alterations and additions to the General Infirmary at Leeds. Meeting: February 20th at Leeds.

With its report the company has issued a folder illustrating various industries in its area which take a supply of electricity from its mains.

The Electrical Distribution of Yorkshire, Ltd., is to hold an extraordinary meeting on March 6th at which proposals will be submitted for increasing the capital to provide for the growing demands for electricity. It is proposed to create for immediate issue 300,000 6 per cent. cumulative preference shares of £1 each and to offer the shares at 24s. per share to holders of ordinary stock in the proportion of one preference share for every £5 of ordinary stock held. The new shares will rank *pari passu* with the 400,000 preference shares created on April 5th, 1932, and since converted into stock. When the whole of the new preference shares have been fully paid it is proposed to convert them into 6 per cent. cumulative preference stock.

The company has declared a final dividend of 4½ per cent. on the ordinary stock, making 9 per cent. for 1933 (unchanged).

The Galloway Water Power Co.—The subscription list was opened on February 13th for an issue of £1,350,000 of 4 per cent. redeemable debenture stock (1957-94) at 101½ per cent. The stock will be redeemed by means of a cumulative sinking fund applied annually in the redemption of stock by purchase at or under par plus accrued interest or by annual drawings at par, commencing in 1944. Interest and sinking fund payments in respect of the stock will be covered from a date not later than August 1st, 1937, by payments which the Central Electricity Board has covenanted to make to the company. Until the commencement of such payments by the Board, interest will be met partly out of grants to be received from H.M. Treasury, and partly out of capital. The company was formed in 1929 to construct five water power stations with an estimated capacity of 140,000 h.p., and the whole of the output of the company will be purchased by the Central Electricity Board. The proceeds of the issue will provide funds for the completion of the works required in connection with the company's generating stations and for general purposes. The first part of the works will shortly be completed and it is expected that the works as a whole will be in operation before the end of 1936.

Hall Telephone Accessories (1928), Ltd., reports a net profit of £34,617 for 1933, as compared with £44,697 for 1932, last year's figures including a profit of £376 from investment sales, against £2,359 in 1932. General reserve receives £7,000, patent reserve £3,000, and income-tax reserve £8,500. A final dividend of 5 per cent. is proposed, making 10 per cent. for the year (unchanged), and £6,957 is carried forward (£6,697). For 1932 the dividend was followed by a bonus distribution of 1½ per cent. The directors state that the profit margin on turnover has been smaller than in 1932, but the works have been fully employed. Orders now in hand are satisfactory, and new lines of business are being developed. Meeting: February 19th.

The Metropolitan Electric Cable & Construction Co., Ltd., reports a net profit for 1933 of £15,580, to which is added £799 brought in, making £16,379. After placing £4,000 to taxation reserve, it is proposed to pay a final dividend of 5 per cent., making 10 per cent., tax free, for the year, to place £5,685 to capital reserve and to carry forward £694. The report states that the turnover for the year constituted a record for the company, but severe competition resulted in a further fall in the rate of profit earned.

The ordinary meeting is to be held to-day (Friday). An extraordinary meeting has been called for March 2nd to consider resolutions for the alteration of the company's articles of association, the increasing of the capital to £150,000 by the creation of 75,000 new £1 shares, and the capitalisation of part of the reserve to be issued as preference shares to the holders of the ordinary shares.

McMichael Radio, Ltd., reports a net profit for the first operating period of fourteen months to December 31st last of £26,123. From this is deducted the profit earned prior to incorporation, written-off preliminary expenses, and directors' salaries to the date of incorporation, leaving £24,946. It is proposed to pay dividends for the period at 8 per cent. per annum on the participating preferred ordinary shares and at 5 per cent. per annum on the ordinary shares, and to carry forward, subject to provision for income tax, £2,597. Meeting: February 19th.

Mather & Platt, Ltd.—The Manchester correspondent of the *Financial Times* reports that the directors are convening an extraordinary meeting at which a resolution will be submitted for the conversion of the £10 preference shares and £1 ordinary shares into stock, transferable in units of £1 each.

The Power Securities Corporation, Ltd., reports a gross income of £132,504 for 1933, as compared with £136,600 in the preceding year, and a net profit of £99,108, against £98,382. Reserve receives £30,000, and the ordinary dividend is maintained at 7 per cent., the balance carried forward being £26,322.

The annual meeting was held on February 14th. Mr. G. Balfour (chairman), who presided, said that notwithstanding the troublesome conditions, they had maintained their position and carried out a satisfactory volume of business at home and abroad. During the year they handled miscellaneous financial business and underwrote or placed eight issues of moderate amounts, varying from £100,000 to £500,000. They completed the construction of miscellaneous works, including 132-kV lines, hydro-electric and Diesel plants at home and abroad, including the Tummel power station for the Grampian Co. The Lochaber works were nearing completion. Their business was naturally affected by world conditions, but they had been able to command sufficient business to fully occupy their organisation. It was satisfactory to know that they would be well occupied for some time and that they had widened their interests and connections abroad. At present they had in hand miscellaneous uncompleted works aggregating about £1,000,000, which was sufficient for a year ahead.

Edmundson's Electricity Corporation, Ltd., reports that during January the electrical energy generated and purchased by its undertakings totalled 52,865,000 kWh, as compared with 44,346,000 kWh in the corresponding month of 1933, an increase of 8,519,000 kWh, or 19 per cent.

The Charing Cross Electricity Supply Co., Ltd., has declared a final ordinary dividend of 3½ per cent., maintaining the year's distribution at 7 per cent.

The Chiswick Electric Supply Corporation, Ltd., has declared a final dividend of 6 per cent., making 11 per cent. for the year (same).

The St. James' & Pall Mall Electric Light Co., Ltd., has announced a final ordinary dividend of 4 per cent., making 7½ per cent. for the year.

Stocks and Shares

TUESDAY EVENING.

GENERAL monetary conditions are such nowadays that borrowers are encouraged to apply for issues, possibly with the idea that they are not likely to do much better by waiting until a later period. In other words, they are ready to take advantage of the money market while the going is good. There is still a lurking apprehension lest, before the year is out, industrial requirements throughout the country may be on sufficiently large scale to call for the provision of capital for trade purposes, to the dislodgement of money from gilt-edged securities, and its employment in the areas of industry. At the present time, although trade is undoubtedly improving, according to most of the industrial pointers that indicate its position, there remains so much money available for investment that people really do not know what to do with it in order to obtain a decent rate of income. It is not everybody who can afford to sell all his gilt-edged stocks and shares and to place the money on deposit with the bank at some fractional rate of interest, in the expectation that prices of these gilt-edged stocks will fall away and enable the repurchase to be effected at a substantial profit by and by. Theoretically this may be sound, but people, they themselves contend, have to live. They prefer to take interest on their capital rather than to spend part of the latter and to risk being able to replace it through the chance of a profit on repurchase of the stock later on.

Galloway Power Debenture

Consequently, investment prices remain very high. There is a constant demand for first-rate stock. This week has seen an offer by Messrs. Lazard Bros. of £1,350,000 Galloway Water

Power Company 4 per cent. redeemable debenture stock, 1957-1994, at what looks the high price of 101½. The company is developing one of the largest sources of water power in the British Isles, and it is stated that the Central Electricity Board will purchase the whole of its electrical output. The issue was over-subscribed in less than half an hour. Central Electricity and other electrical boards' stocks show no changes. London Passenger Transport "B" at 119½ is a point lower. The only feature in the market for home railway prior-charge issues is the continued contraction of the amount of stock available for investment. Such Continental turmoils as those from which Austria, France and Spain are now suffering have the effect of emphasising the stability of securities in British domestic undertakings.

Electricity Supply Shares

The tendency in the market for home electricity supply shares continues to be slightly easier. County ordinary have gone back to 56s. 3d., and Metropolitans to 54s. 6d. Prices of the other shares that are governed by the conditions of the standardised rate of 7 per cent. dividend are little changed, most of them remaining at 34s. or 34s. 6d. The Yorkshire Electric Power Company reports a substantial increase in net profits. The Electrical Distribution of Yorkshire proposes to increase its nominal capital to £2,200,000. Holders of the ordinary shares will be offered 300,000 6 per cent. cumulative preference shares of £1 each at 24s. in the proportion of one preference share for every complete £5 of ordinary stock. This constitutes a modest bonus, because the company's existing 6 per cent. preference shares are quoted at 30s., this price including the half-yearly dividend payable immediately.

Americans and Canadians

The market in dollar stocks has been disturbed by the announcement from Washington that President Roosevelt intends to include in his programme a close supervision over dealings in stocks and shares in the New York and other American Stock Exchanges. Drastic curtailment of facilities for speculation are proposed, and, if these are brought into operation, it is presumed that the American public's appetite for dealing in stocks and shares will be greatly checked. In consequence, prices have given way, though Canadian utilities continue to be well supported. American Telephone and Telegraph shares are 4 down at 120½. Internationals at 15¼ show a drop of 2¼. Montreal Light & Power shares at 38¼ are ½ lower. Shawinigan Water at 24 are, however, 1¾ up. Something of a feature in the group of overseas stocks is a jump to 58½ in the participating debenture stock of the Perak River Hydro-Electric Company, this being 4 points up, following a rise of 2½ last week.

It is thought that if President Roosevelt initiates repressive legislature against the Americans' freedom of dealing in stocks and shares, one result will be a great impetus to business in these issues on the London Stock Exchange.

Manufacturing and Equipment

For the same reason as that mentioned here last week to explain a few falls in the prices of shares in cable manufacturing and equipment companies—namely, that sales were made in order to provide money to meet obligations incurred elsewhere—quotations for some of the leaders have again declined. Enfields have been especially weak, going back 6s. 3d. to 90s. Shares changed hands at 87s. to-day, Tuesday. Enfield Rolling Mills are 1s. easier at 29s. Callenders and British Insulated show falls of ¼ and 1/16 respectively. No special reason, other than that just given, can be found to account for the dullness in the prices of these particular shares. The glamour of gold-mining continues to allure. Owing to a fairly general fall in some of the favourite speculative counters, it has become necessary to obtain money to pay for purchases or to meet differences, the money being provided, as shown, by sales of stocks and shares in other markets.

Philips Incandescent Lamp Works Holding shares have gone back to 49s., in spite of Amsterdam rumours that the subsidiary, Philips Incandescent Lamp Works, would declare a dividend at the rate of 10 per cent. per annum for the sixteen months ending with April 30th this year. Siemens have weakened to 20s. 9d. Arons are a good market at 54s. 9d.

Miscellaneous Matters

Hall Telephone Accessories reports a net profit for last year of £34,600, showing a decline of £10,000 as compared with the previous year. Of this latter amount, a fifth is due to a decline in the amount of investment profits. The dividend is maintained at 10 per cent. for the year, with, however, no bonus of 1½ per cent., such as was declared in the preceding period. The price of the shares is easier at 18s. 6d. Electric and Musical Industries continue to attract considerable interest, but the price has gone back a little to 23s. on selling said to emanate from New York. In connection with this company, it is of interest to observe the registration of H.M.V. (Household Appliances) with a nominal capital of £100. This newcomer is a grandchild of Electric & Musical Industries, and proposes to undertake the production of electrical cookers and heaters, refrigerators and other household accessories. Canadian Marconis keep moderately active around 12s., and a steady business in Associated Equipment shares has left the price unchanged at 32s. 6d. Iron and steel shares are inclined to be dull. The rubber share market weakened as a consequence of rubber dwindling in value.

Share List of Electrical Companies

	Nom.	Approx. Dividend. 1931.	1932	Price, Feb. 13.	Rise or Fall.	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES.						
Bournemouth and Poole	1	15	15	78/3	—6d.	3 17 0
Brompton Ordinary	1	8½	7	34/-	—	4 2 4
Charing Cross Ordinary	1	8½	7	34/6	—	4 1 2
Chelsea	1	8½	7	34/-	—6d.	4 2 2
City of London	1	10	10	35/-	—	4 0 0
Clyde Valley	1	7	7	41/3	—	3 8 0
County of London	1	10½	10½	56/3	—¼	3 14 9
Edmundson's 7% Pref.	1	7	7	34/-	—	4 2 4
Elec. Dis. Yorkshire	1	9	9	47/6	—	3 16 0
Elec. Supply Corporation	1	11	11	76/3	—¼	2 17 8
Kensington Ordinary	1	8	7	34/6	—	4 1 2
Lancs Light and Power	1	7	7	37/-	—	3 15 8
London Electric	1	9	7	34/6	—	4 1 2
Metropolitan	1	10	10	54/6	—6d.	3 13 3
Midland Counties	1	7	7	38/9	—	3 12 2
Mid. Elec. Power	1	8	8	44/6	—6d.	3 12 0
North Eastern Electric Ordinary	1	6	6	35/-	—1/-	3 6 8
Do. 7% Pref.	1	7	7	34/6	—	4 1 2
Northampton	1	10	10	55/-	—	3 12 9
Notting Hill 6% Pref.	10	6	6	13¾	—	4 8 11
North Met. Elec. Ordinary	1	—	10	3⅛	—	3 2 9
Do. do. 6% Pref.	1	6	6	30/-	—	4 0 0
St. James' and Pall Mall	1	8	7	35/-	—	4 0 0
Scottish Power	1	8	8	2⅛	—	3 17 8
South London	1	8½	7	34/6	—	4 1 2
Westminster Ordinary	1	8½	7	34/6	—	4 1 2
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	22/-	—	6 16 4
Yorkshire Elec.	1	8	8	47/6	—	3 7 8
PUBLIC BOARDS.						
Central Electricity, 1950–70	...Stock	5	5	111	—	4 10 1
Do. 1955–75	... „	5	5	114	—	4 7 6
Do. 1951–73	... „	4½	4½	106	—	4 5 0
Do. 1963–93	... „	—	3½	94½	—	3 14 1
London & Home Counties, 1955–75	„	4½	4½	108	—	4 3 4
London Passenger Transport, A	... „	—	4½	116	—	3 17 7
Do. do. B	... „	—	5	119½	—1	4 3 8
Do. do. C	... „	—	—	84	—	—
West Midlands Joint Elec. 1948–68	„	—	5	114	—	4 7 6
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	... $100	9	9	120½	—4	7 9 4
Anglo-Am. Tel. Pref.	... Stock	6	6	112	—1½	5 7 2
Do. Def.	... „	1½	1½	28	—¼	5 7 2
Cables & Wireless 5½% Pref.	... „	2¾	2¾	71½	—1	3 17 0
Do A 7½% Ord.	... „	Nil	Nil	24	—	—
Do. B. Ord.	... „	Nil	Nil	10½	—	—
Globe Tel. and T. Ord.	... 10	Nil	2½	10	—	2 10 0
Do. do. Pref.	... 10	6	6	12½	+¼	4 16 0
Great Northern Tel.	... 10	20	20	36½	—½	5 10 4
Marconi-Marine	... 1	10	7½	31/3	—	4 16 0
Oriental Telephone Ord.	... 1	12	12	3½	—	*3 16 10
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref.	... 5	Nil	Nil	2/-	—	—
Do. do. 2nd Pref.	... 5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	... Stock	Nil	Nil	6	—	—
British Electric Traction Df. Ord.	„ 5	5	490	—20	—	
Do. do. Pref. Ord.	... „	8	8	147½	—	5 8 6
Brazil Traction	... 100	—	—	13½	—	—
Brit. Columbia Elec. Rly. Pce.	... Stock	5	5	100½	—	4 19 6
Mexico Trams, 5% Bonds	... —	5	5	22½	—	22 4 4
Mexican Light Common	... 100	Nil	Nil	8	—	—
Do. 7% Pref.	... 100	7	7	11	—	—
Do. 1st Bonds	... —	5	5	47½	—	10 10 6
Victoria Falls Ord.	... 1	15	20	5⅝	—⅛	3 14 6
Yorkshire (West Riding)	... 1	Nil	Nil	17/-	—	—
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	4	4	19/9	—	3 18 3
Do. Pref.	1	8	8	31/3	—	5 2 5
Babcock & Wilcox	1	14	9	42/6	—	—
British Aluminium Ord.	1	5	5	31/-	—1/-	3 4 6
British Insulated Ord.	1	15	15	73/9	—¼	4 1 4
Brush Ord.	... Stock	Nil	Nil	40	—	—
Callender's	1	15	15	62/6	—½	4 16 0
Do. 6½% Pref.	1	6½	6½	30/9	—	4 4 6
Crompton Parkinson Ord.	... 5/-	22½	12½	25/-	—	—
Do. 8% Pref.	1	8	8	31/3	—	5 2 5
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	6 2 5
Do. 5% Deb.	... Stock	5	5	102½	—	4 17 7
Electric Construction	1	Nil	Nil	10/-	—	—
Enfield Cable Ord.	1	25	25	90/-	—¼	5 11 1
English Electric	1	Nil	Nil	6/3	—	—
Do. do. Pref.	1	Nil	Nil	8/9	—	—
Ever Ready	5/-	35	35	80/-	—	5 16 8
Ferranti Pref.	1	7	7	26/6	—	5 5 9
G.E.C. Pref.	1	6½	6½	30/-	—6d.	4 6 8
Do. Ord.	1	8	8	44/6	—	3 12 1
Henley's	1	30	30	6⅛	—	4 15 6
Do. 4½% Pref.	5	4½	4½	5½	—	4 5 9
India-Rubber Preferred	1	—	—	15/-	—	—
Johnson & Phillips	1	5	5	21/3	—	4 14 1
Siemens Ord.	1	7½	6½	20/9	—⅛	—
Telegraph Construction	£1	Nil	Nil	27/6	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parenthesis are those under which the specifications will be printed and abridged and all subsequent proceedings taken.

1932

10328. "Wireless receiving apparatus." Bendix Aviation Corporation. April 11th, 1931. (404659.)

15993. "Electric control and relay systems." International General Electric Co., Inc. June 3rd, 1931. (404611.)

16565. "Thermionic devices." P. Freedman. June 11th, 1932. (404646.)

18760. "Electric starting motors for internal combustion engines." A. Kaufmann. July 2nd, 1932. (404725.)

19013. "Remote-control means for railway reciprocating engines." General Electric Co., Ltd., E. H. Croft and J. C. Turrall. July 5th, 1932. (404662.)

19247. "Method of and means for purifying gases electrically." Siemens-Schuckertwerke Akt.-Ges. and Dr. R. Heinrich. July 7th, 1932. (Addition to 375865.) (404635.)

19280. "Laminated electro-magnetic cores." V. Z. de Ferranti and Ferranti, Ltd. July 7th, 1932. (404620.)

19720. "Light signals." British Power Railway Signal Co., Ltd., S. L. Glenn and E. E. Pierce. July 12th, 1932. (404649.)

19834. "Electric motor-control systems." British Thomson-Houston Co., Ltd. July 13th, 1931. (404623.)

19837. "Protective systems for electric circuits." British Thomson-Houston Co., Ltd. July 13th, 1931. (404650.)

19940. "Construction of block for use with electrical fittings." D. S. Cramb. July 14th, 1932. (404624.)

20048. "Electrical resistances." Igranic Electric Co., Ltd., and A. H. Curtis. July 15th, 1932. (404626.)

20174. "Electric motors for electro-optical and like systems." W. W. Jacomb and Baird Television, Ltd. July 16th, 1932. (404642.)

20222. "Time switches." Sangamo Electric Co. June 9th, 1932. (404688.)

20338. "Modulation of alternating current." International General Electric Co., Inc. July 16th, 1931. (404656.)

20431. "Machines for winding electrical coils." Universal Winding Co. April 9th, 1932. (404690.)

20443. "Electron-discharge tubes." Standard Telephones & Cables, Ltd. (E. Rostas). July 19th, 1932. (404672.)

20459. "Electric telegraph systems." Electrical Research Products, Inc. July 31st, 1931. (Addition to 319032.) (404675.)

20491. "Electric lamps." V. A. B. Hughes. (S. J. Tucker.) July 20th, 1932. (404692.)

20602. "Arrangement for measuring the distortion factor of electric wave transmission systems." C. Lorenz Akt.-Ges. August 5th, 1931. (404697.)

20720. "Automatic volume control arrangements for use in connection with thermionic valve apparatus." Marconi's Wireless Telegraph Co., Ltd., and S. Aisenstein. July 22nd, 1932. (404706.)

20721. "Electrical overload, safety alarm, and like devices." Marconi's Wireless Telegraph Co., Ltd., and A. T. Witts. July 22nd, 1932. (404707.)

20722. "Electronic detecting devices for high-frequency carrier waves." Marconi's Wireless Telegraph Co., Ltd., and E. W. B. Gill. July 22nd, 1932. (404708.)

20723. "Radio and other modulated carrier-wave transmitters." Marconi's Wireless Telegraph Co., Ltd., and W. T. Ditcham. July 22nd, 1932. (404709.)

20724. "Radio and other modulated carrier-wave systems." Marconi's Wireless Telegraph Co., Ltd., and W. T. Ditcham. July 22nd, 1932. (404710.)

20743. "Picture transmission systems." Electrical Research Products, Inc. July 25th, 1931. (Addition to 311810.) (404715.)

20950. "Making of glass and electric furnaces therefor." Hartford-Empire Co. July 25th, 1931. (404733.)

20990. "Rotary transformers for direct electric currents." G. M. Pestarini. July 25th, 1932. (404734.)

21071. "Electric acoustic devices." Moto Meter Gauge & Equipment Corporation. April 21st, 1932. (404736.)

21230. "Electric controlling devices." International General Electric Co., Inc. July 27th, 1931. (404738.)

21337. "Direct-current electric motor equipment operated in connection with rotary direct-current transformers." G. M. Pestarini. July 28th, 1932. (Cognate application 16479/33.) (404739.)

25456. "Electromagnetic step-by-step switches." General Electric Co., Ltd., C. C. Puckette and W. R. Rose. September 13th, 1932. (404761.)

27746. "Slide rails for dynamo-electric machines." Laurence, Scott & Electromotors, Ltd., & J. J. Gillespie. October 6th, 1932. (404767.)

29676. "Means for starting electric discharge apparatus operating high-frequency furnaces." Allmänna Svenska Elektriska Aktiebolaget. September 24th, 1932. (Addition to 402791.) (404779.)

30476. "Electric heaters or radiators." B. Thomas and E. Thomas. October 31st, 1932. (404784.)

1933

3361. "Dry rectifiers and methods of treating the same." British Thomson-Houston Co., Ltd. February 6th, 1932. (404812.)

4712. "Electric induction motors." A. Crawford. February 16th, 1933. (404816.)

6219. "Cable joints." Okonite-Callender Cable Co., Inc. March 1st, 1932. (404820.)

10580. "Means for regulating the speed of electrically-driven machines." International General Electric Co., Inc. April 9th, 1932. (404837.)

14588. "Liquid blast electric circuit-breakers." British Thomson-Houston Co., Ltd. May 20th, 1932. (404857.)

14636. "Automatic circuit-breaker for ignition circuits of motor-driven vehicles and crafts, operable on collision or overturning." H. M. Salmond. May 20th, 1933. (404858.)

14951. "Electric circuit-interrupters." Westinghouse Electric & Manufacturing Co. May 25th, 1932. (404861.)

16056. "Electric arc lamps." General Electric Co., Ltd. June 11th, 1932. (404865.)

17548. "Electrically-heated steam-generating installations." Sulzer Frères Soc. Anon. December 23rd, 1932. (404870.)

20002. "Junction sleeves for submarine cables." Felten & Guilleaume Carlswerk Akt. Ges. July 27th, 1932. (404882.)

20584. "Valve receiving-sets for wireless signalling and the like." Ideal Werke Akt.-Ges. für Drahtlose Telephonie. August 18th, 1932. (404884).

20630. "Electric incandescent lamps." General Electric Co., Ltd. July 22nd, 1932. (404716.)

23273. "Electric alarm apparatus responsive to wireless signals." S. W. F. O. Olin. August 21st, 1933. (404896.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections may be entered against any of the proposed marks within one month from February 7th:—

Western Electric Sound System (lettering and design). No. 546611. Class 8. Recording and reproducing apparatus for sound cinematograph films.—Western Electric Co., Ltd., Bush House, Aldwych, W.C.2.

Ferrocart. No. 547399. Class 8. Radio broadcasting apparatus and parts thereof.—British Ferrocart Co., Ltd., Magnet House, Kingsway, W.C.2.

Imicoal. No. 545355. Class 18. Electric fires and radiators.—Lighting Trades, Ltd., 251-255, Garratt Lane, Wandsworth, S.W.18.

Electricity Supply in Austria

THE statistics of Austrian water and thermal power plants of 500 kW or higher rating, issued by the Verband der Elektrizitätswerke, Vienna, and relating to the year 1932, are said to represent the first official compilation covering public supply, private industrial and traction undertakings. The following data, from an analysis by Dr. Josef Ornig in *Elektrotechnische Zeitschrift*, show the distribution of generating equipment and consumption between the various classes of plant and load, together with such comparisons as are practicable bearing in mind the restricted scope of earlier statistics.

The total generating capacity in service at the end of 1932 was about 1,031,000 kW (excluding installations below 500 kW), 65 per cent. being operated by water power and 35 per cent. by thermal plant; of the total, 67 per cent. was in public supply service, 27 per cent. in private industrial installations, and 6 per cent. in traction service. The energy generated during the year amounted to 2,183,000,000 kWh, of which 81 per cent. was derived from water power and 19 per cent. from thermal plant (mainly steam, there being, however, seventy Diesel sets of 16,000 kW, generating about 9,000,000 kWh). The energy generated for public supply was 65 per cent., by industrial plants 30 per cent., and by traction plants 5 per cent. of the total, *i.e.*, approximately in the same ratio as the generating capacity, but the average load factor of the water power plant was about 2.4 times that of the thermal plant (2,630 hrs. per annum utilisation of maximum capacity compared with 1,100 hrs.).

The annual output of forty large undertakings, representing about half the total for the country, rose from 954,000,000 kWh in 1927 to 1,166,000,000 kWh in 1930, an increase of 22.2 per cent., but thereafter fell to 1,079,000,000 kWh in 1932, a decrease of 7.5 per cent. On the whole, the electricity consumption during the years of crisis has been well maintained, the decrease in industrial loads being largely compensated for by the growth in public supply, including electric cooking.

The plant capacity of sub-stations in 1932 totalled about 2,650,000 kVA, or about 2½ times the generating capacity, 29 per cent. being for 100 kV or over, 21 per cent. for 30 to under 100 kV, and 50 per cent. for 20 kV or under. The transmission and distribution networks totalled about 30,000 km. (18,750 miles) in length, nearly 55 per cent. being h.p. circuits and 80 per cent. of these overhead lines. The four largest public supply undertakings represent about half, and the ten largest about two-thirds, of the total generating and transforming capacity and output.

The total annual generation in Austria averages about 350 kWh per capita and the consumption 250 kWh within the frontiers, or 300 kWh including exported energy; these figures are increased by about 10 per cent. when plants below 500 kW are included. The distribution of the total consumption is approximately: Small consumers 15.7 per cent.; public lighting, 1.5 per cent.; large consumers 20.1 purchased, and 37.0 per cent. privately generated; traction, 12.3 per cent.; and export, 13.4 per cent. In towns, the average consumption by small consumers represents about 100 kWh (and in the country 30 kWh) per annum per head of population. More than half of the private industrial generation is in cellulose, paper, and iron, steel and other metal works.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Alterations and additions to Walker Road School, Torry (£23,890); city architect.

Airdrie.—Houses (294). £90,000; burgh surveyor.

Amblecote.—Houses (24); Webb & Gray, U.D.C. architects, 82, High Street, Stourbridge.

Andover.—Houses (50); borough surveyor.

Barnsley.—Houses (95), Burton Grange; H. Taylor, architect, Town Hall. School, Littleworth (500 places), for Borough E.C.; Dyson, Cawthorne & Coles, architects.

Barrow-in-Furness.—Houses (26), Ancaster Street; F. Barrow & Co. Houses (500), in two years; borough engineer.

Birkenhead.—Houses (24), Woodchurch Road; A. H. Boulton. Block of three-storey tenements; B. Robinson, borough engineer.

Birmingham.—Houses (60), Colebrook Road, Shirley; A. Robinson, builder, 83, Colmore Row. Factory, Adams Street, Aston (£8,000), with electrical work; W. & J. Webb & Sons, builders, Soho Hill. Rebuilding, St. John's Schools, Stratford Road, Sparkhill; W. H. Hobbiss, architect, 33, Newhall Street.

Blackburn.—Houses (500); borough surveyor.

Blackpool.—Cinema and shops, Lytham Road. South Shore, for the Majestic Cinema Company; Whitaker & Gardner, architects, Edward Street. Construction of pier, Cleveleys (£60,000), including tennis and badminton courts, &c.; A. E. Lancashire, 12-13, Albert Buildings, Corporation Street, Preston.

Blyth (NORTHUMBERLAND).—Houses (59); L. Leeper, borough surveyor.

Bolton.—Houses (24), Crompton Fold Estate; W. Gornall & Sons, Ltd. Two schools, Johnson Fold and Top Brow estates, for E.C.

Boston.—Nurses' home (£5,010); Pearson & Blackwell, Ltd., builders, Doncaster.

Brentwood.—Baths (£5,250), electrical work; A. J. Meeson, U.D.C. surveyor.

Brighton.—Junior school (420 places), Warmdene Road, and recreation hall, Training College (£3,300), for Borough E.C.; Director of Education.

Bristol.—Houses (100), Bedminster Estate (£23,686); E. A. W. Poole & Sons. School, Ilminster Avenue, for E.C.

Bromley (KENT).—Houses (204), for C. H. Tyler, block of shops, Southborough; T. S. Bright, architect, 2, New Court, London, W.C.

Canterbury.—Slipper baths, bath hall, &c. (£15,770); city surveyor.

Cardigan.—Houses (30); R.D.C. surveyor.

Castle Bromwich (BIRMINGHAM).—Houses (50), Old Chester Road; Hales & Co., builders, Cotton Lane, Nuneaton.

Caterham.—Houses (26), Hillbury Road; A. M. Cawthorne. Houses (46), Markfield Estate; J. A. Smith & Son.

Cheam.—Central school (£23,860); William Moss & Sons.

Cheltenham.—Lido (£14,000), with electrical work; J. S. Pickering, surveyor, Municipal Offices, The Promenade.

Chesterfield.—Houses (134); Jackson & Fryer and W. H. Wagstaff & Sons, architects.

Darlington.—Houses (32); J. Clayton, architect, High Row Chambers.

Dartford.—Houses (140), Darenth & Swanley Junction, by direct labour; R.D.C. surveyor.

Deal.—Houses (226), Mill Hill and Telegraph Road; First National Trust, Ltd.

Doncaster.—School (£21,900), the Park, for Borough E.C.; Education Architect.

Dundee.—Shops, Arbroath Road; W. M. Patrick, architect, 26, Yeaman Shore. School, Caird Avenue, for Corporation; city architect.

Durham.—Houses (100), Sherburn Road; W. J. Greene, city engineer.

Eccles.—Houses (30), Council estates; borough engineer.

Edinburgh.—Houses, shops, and garages, Gorgie, for Lothians District Buildings, Ltd., 85, Hanover Street; John A. W. Grant, architect, 3, Thistle Court.

Epsom.—Junior school, Stoneleigh (£9,325); Ashford Builders Co.

Essex.—School, Hawkwood Housing Estate, Chingford, for County E.C.; Director of Education, Chelmsford.

Gloucester.—Factory, Bristol Road, for W. S. Barron & Son, Ladybellegate Street.

Halesowen (WORCESTERSHIRE).—Cinema, Long Hill and Cakemore, for the Odeon (Blackheath), Ltd. (£22,000), with electrical work.

Hastings.—Houses (24), Old London Road, for George Fryer; F. Gordon Watford, architect. Aerodrome, Pebsham (£40,000); Norman Muntz & Dawbarn.

Hinckley (LEICESTERSHIRE).—Houses (70), new road, Coventry Road; L. & A. Freeman, builders, Joinery Works, Stoke Golding.

Hornchurch.—Passenger station, Elm Park, for the London, Midland & Scottish Railway Co.

Ilkeston.—Houses (40), Longfield Lane; Derby & Notts Estates Co., Ltd.

Ipswich.—Houses (50), Gainsborough Estate (£15,204); Building & Public Works Construction Co., Ltd.

Irish Free State.—(LOUTH).—Technical school, Drogheda, for the Vocational E.C., Fair Street, Drogheda; W. H. Byrne & Son, architects, 20, Suffolk Street, Dublin.

Isle of Wight.—Extensions, Newport Secondary School (£7,300), for County E.C.; Director of Education, Newport.

Kelso.—Town Hall (£10,000); W. Barclay, architect, Glasgow.

Leicestershire.—Corporation offices, Charles Street, Leicester (£126,479), for C.C.

Leighton Buzzard.—Houses (56); U.D.C. surveyor.

Lincolnshire.—Maternity home, Scunthorpe (£20,000), and additional accommodation to police station (£2,580), Skegness, for C.C.

London.—(EAST HAM).—Reconstruction of Empire Cinema, Barking Road; Cinema Co. (GROVE PARK).—School (700 places), Cooper's Lane, for London E.C. (HACKNEY).—Ten blocks of flats, Amhurst Road; Sir John Burnet, Tait & Lorne. (KENSINGTON).—Extensions, St. Charles Hospital (£34,568); L.C.C. architect.

Long Sutton (LINCS).—Fruit-bottling factory (electrical work), for Philip Lockwood

Lymm (CHESHIRE).—Houses (26), Rush Green, for J. E. Avey.

Manchester.—Three schools, housing estates, for E.C.

Motherwell.—Houses (312), Greenhead Road, Wishaw (£96,000), and extensions, Town Hall (£9,000); burgh surveyor.

Newcastle-on-Tyne.—Garage and factory for J. J. Greenfield, Carliol Square; C. W. Milburn, architect, Felthams, Darlington. Senior school for boys, Northumberland Road, for E.C.; city architect. Reconstruction of Fleming Hospital for the Governors (£40,000). Gymnasium, St. Aloysius School; J. Mackin, builder, Felling-on-Tyne.

Oldbury (WORCESTERSHIRE).—Houses (100), Bleakhouse Estate; Wm. Greenwood, surveyor, Town Hall.

Oldham.—Houses (72), Collier Hill Estate; borough engineer.

Onchan (ISLE OF MAN).—Three-storey bank premises, for the Isle of Man Bank; manager.

Oxford.—Houses (38), Westfield Estate; Isis Properties, Ltd.

Perth.—Houses (200), Crieff Road; burgh surveyor.

Redruth.—Houses (92); T. F. King, U.D.C. surveyor.

Reigate.—Cinema, for Reigate Hippodromes, Ltd.; secretary.

Romford.—Houses (190), Mawney Park Estate, for T. Blade. Houses (48), Rainham; R.D.C. surveyor.

Rotherham.—Houses (280), Eastwood Estate (£68,213); O. Weaver, Mexborough.

St. Neots (HUNTS).—Houses (20), Crescent Estate; Mr. Parkinson, U.D.C. architect.

Sale.—Houses (170), Marsland Road, Brooklands, Sale; W. H. Matthews, Ltd., builder, Walton Road.

Scarborough.—Church, Murray Street; Wilkinson and Smith, architects, Queen Street.

Sheffield.—Houses (230), Wybourn Estate (£66,447); M. J. Gleeson, Ltd. Houses (2,000) this year for slum clearance scheme; city architect. Cinema, Sicey Avenue; J. F. MacDonald.

Southport.—Town hall improvement for Special Committee.

Stafford.—Rebuilding the Guildhall, with electrical work; W. Plant, borough engineer, Borough Hall.

Staffordshire.—Schools, Stafford, Leek, Quarry Bank, Rugeley and Tamworth, for County E.C.; county architect, Stafford.

Stockton-on-Tees.—Houses (72), Blairs Allotments; Lane and Fox, builders, 13, Southfield Crescent, Norton.

Stretford.—Houses (24), Lindum Avenue; Smith & Allcock, Ltd. Library, King Street (£15,000); P. Howard, architect, 88, Mosley Street, Manchester.

Sunbury-on-Thames.—Houses (28) and shops adjoining Hallett's Farm; J. Farmer, 186, Staines Road.

Sunderland.—Houses (100), Newcastle Road Estate, by private enterprise; Arnold Suttel, architect, 2, Victoria View, Harrogate, Yorks. Swimming bath, Hendon Road; T. P. Collinge, borough surveyor.

Surrey.—New premises for County Secondary School, Wallington; county architect, Kingston-on-Thames. Extensions, County Hospital, Epsom, for County C.C.; F. J. Hodgson, architect, Guildford.

Sutton.—Baths and public hall, Cheam (£42,000); U.D.C. surveyor.

Sutton Coldfield.—Houses (270), Edge Hill Estate; borough engineer. Houses (20), Lakehouse Road; S. Spollen.

Swindon.—Houses (600), Drove Road Estate; A. J. Colborne. Bank for the National Provincial Bank, Ltd., Regent Street; F. R. C. Palmer. Shops, offices and flats, Victoria Road; J. T. Parsons & Sons.

Torquay.—Houses (200), Barton; borough engineer.

Wakefield.—Houses (15), Horbury Road; W. H. Ogden.

Walmer.—Houses (90); L. Holland & Co., Ltd.

Warrington.—Works extensions, Bewsey Road; Lancashire Steel Corporation. Works extensions, Dallam Lane; Whyman's Foundry Co.

Watford.—Houses (38), Kingswood Estate; Hillington Estate Co. Houses (10), Bushey Mill Lane; Rice & Sons. Municipal Buildings, competition; Vincent Harris, assessor. Shops and houses, Wiggenhall; borough engineer.

West Riding.—Schools, North Elmsall, Stainforth and caretaker's house, Technical Centre, Wombwell, and extensions, High School, Bentley; Middle School, Conisborough, and Upton Council schools; H. Wormald, architect, County Hall, Wakefield. Mixed secondary school, Shipley, for C.C.

Whitley Bay (Northumberland).—Houses (302), South Hartley Farm; J. Potts & Son, architects, John Street, Sunderland.

Widnes.—Houses (487); borough surveyor.

Wigan.—Houses (157), Alder Lane, Parbold; Pierpoint & Worthington, architects, 31a, King Street.

Willington-on-Tyne.—Presbyterian church; Rev. A. T. Ogilvie, Chairman of Newcastle Presbytery Advisory Committee.

Worcester.—Additions to the museum, library and technical school, Victoria Institute, Foregate Street; A. G. Parker, architect, Avenue, the Cross.

Workington.—Baths (£5,000); borough engineer and trade contractors.

Worthing.—Houses (40), Goldsmith Road; S. C. Phillips. Houses (33), Lavington Road; R. Hasler. Houses (34), Littlehampton Road; Jeffery Houses, Ltd. Cinema, Bath Place; Universal Estates, Ltd.

COMPANY MEETING.

THE POWER SECURITIES CORPORATION, LTD.

The eleventh annual general meeting of the above Corporation was held on February 14th at Winchester House, London, E.C.

Mr. George Balfour, J.P., M.P. (the chairman), in the course of his speech, said: The accounts submitted for your approval show that we have, notwithstanding the troublesome conditions, maintained our position and carried out a satisfactory volume of business at home and abroad.

I would like to make it clear that we are not an investment trust, and during the first few years of our existence I emphasised this at our annual general meetings. Our business is a general financial and trading business, largely concerned with financing, developing and constructing all classes of public utility properties. We may, and frequently have, large sums employed in construction or other syndicates yielding for the time being no interest, but these operations produce their reward in one or other branch of our activities, and so far we have justified our participations.

Business of the Past Year

During the year we handled miscellaneous financial business and underwrote or placed eight issues of moderate amounts, varying from £100,000 to £500,000. We completed the construction of miscellaneous works, including heavy 132-kV lines, hydro-electric and Diesel plants at home and abroad, including the Tummel Generating Station for the Grampian Company, this plant comprising an installation of about 50,000 horse-power. The Lochaber works are nearing completion, the work being up to time and carried out in every way according to plan. The advances we made for the construction of the Continental Hydro-electric works have been repaid in cash and first-class sterling bonds, and we have satisfactorily concluded this transaction and established relations which will be of value in the future. We have not been able to proceed with Hungarian business, but hope that in the near future the Continental situation may become sufficiently settled to allow us to make progress.

Our business is naturally affected by world conditions at home and abroad, and the number of countries in which we can operate with reasonable security is limited. We have, nevertheless, been able to command sufficient business to fully occupy our organisation, but so long as present artificial conditions continue, we must move with extreme caution. At present we have miscellaneous uncompleted works aggregating about £1,000,000, which is less than for the last year or two but sufficient for a year ahead.

Gold and Currency

Perhaps you remember that last year I had something to say about the gold standard, the relation of gold to currency, and the foundation of both. The experience of the past year confirms my view and my determination to follow realities and not theories. I am glad to note that cold, hard facts are driving economists to some understanding of the foundation of currency and its relation to gold as a standard, and I hope to understand that economics are deduced from action and not action from economics.

It would be appropriate if I repeated what I said last year, but it would unfairly tax your patience. One short paragraph I might repeat—I said, "Effort value is, and must ultimately be, the standard of exchange and gold the token of such standard, so long as the winning of gold maintains its present relation to effort. Sterling is ultimately on or off gold in direct proportion to the effort value of the people in this country engaged in industry."

The American Experiment

A year ago the dollar was at a large premium on sterling, and is now at a small discount. Some people only a few weeks ago predicted the dollar falling to eight or ten dollars to the pound sterling, due to the Roosevelt policy. The fact is, if the effort values in America and Britain, in pursuit of unfettered industrial enterprise, are the same, then the currencies of the two countries will be on a parity and the relation of the currencies to gold will correspond.

The American experiment should do a great deal to explode the belief that even an American President, or, rather, an American Professor, can stabilise by statute. By forcing up the price of gold artificially, currency for the time being is depreciated in terms of gold; but when we get through all these experiments (and we are already well on the way), then gold will revert to a normal price in terms of the pound sterling or dollar, provided the people of such industrial countries depend upon real effort and not the artificial stimulus of State aid.

Our prosperity is bound up with the country's prosperity. I want to say a word to business men of all kinds to urge them to take a greater interest in the affairs of the country, quite apart from their interest in their own immediate business, and not merely to protect their own business interest.

Turning to the profit and loss account, the gross income is £132,504, against the previous year's figure of £136,600, a reduction of £4,000. Administration and general expenses are nearly £5,000 less at £31,796, compared with £36,618 for the previous year. We have a substantial amount of work in hand, although less than for the last few years, but, on the other hand, we have taken no profit on any works not completed, and as we have at present heavy works which are just completing, we shall have the benefit of the completion of these works in the current year's account. I think the balance resulting from the year's work is satisfactory.

The report and accounts were unanimously adopted, and a dividend of 7 per cent., less income tax, on the issued ordinary shares for the year to December 31st, 1933, was declared.

4435

Electrical insulation

OF ALL TYPES
FOR EVERY PURPOSE

"ATLAS" Insulating Materials are world-famous, and are giving exemplary service under arctic and tropical conditions.
They are the perfected result of many years' experience in the manufacture of insulation. Continual research and test ensures a rigid maintenance of the high guaranteed standard of quality that has made "ATLAS" pre-eminent.
The stock of all classes of "ATLAS" Insulating Materials is one of the largest in the world, and prompt deliveries are assured.
Write to-day stating your requirements. Prices are exceptionally keen.

"CLARKE'S" "ATLAS" Specialities

"ATLAS" INSULATING SILK & CLOTH.

TAPES
in Varnished Cambric, Indian and Egyptian Cotton, Silk and Braid.

SLEEVING.
"Atlas" Superfine Quality in all dimensions up to 16 m/m.

BLACK ADHESIVE TAPES.
Best Superfine Quality.

MICANITE SHEETS
in Moulding and Commutator Qualities.

MICA TUBES & WASHERS.

BAKELITE SHEETS, RODS AND TUBES.

"CLARKE'S" "ATLAS" INSULATING MATERIALS

H. CLARKE & CO. (MC/R.) LTD.,
GEORGE STREET, PATRICROFT, MANCHESTER.
'Phone: 2001-2-3 & 4. 'Grams: "Pirtoid, Manchester."
Southern Offices and Stores: BUSH HOUSE, LONDON, W.C.2.
Temple Bar 7130.
Glasgow Office: 38, OSWALD STREET.
'Phone: Central 7445-6.
Contractors to the British and Foreign Governments.

A Selection of

CONSTABLE'S BOOKS

CHARLES PARSONS : His Life and Work

By ROLLO APPLEYARD. **15s.** net.

Birmingham Post—"The book is written with sympathy and understanding. It is an excellent portrait of Parsons, finely limned, and one is glad that no further delay has come in presenting the public with the life of one whose name will be for ever associated with the 'Turbinia' . . . The book was worth doing, and it has been well done."

PHYSICAL CHEMISTRY

By Dr. JOHN EGGERT, Professor at the University of Berlin. Revised in collaboration with Dr. LOTHAR HOCK, Professor in the University of Giessen. Translated by S. J. GREGG, Ph.D., A.R.C.Sc. With an Introduction by W. A. CASPARI, D.Sc. **24s.** net.

The Industrial Chemist—"The book is about equal in standard to that expected for an honours degree in chemistry, and should therefore make its widest appeal to students of this category."

THE SELENIUM CELL

Its Properties and Applications

By G. P. BARNARD of the National Physical Laboratory. *Illustrated.* **35s.** net.

Discovery—"Mr. Barnard deserves the thanks of all scientific workers for this excellent compilation of knowledge concerning selenium . . . it will become the standard work of reference on the subject."

FACTORY COSTING

By H. H. EMSLEY. **7s.** net.

The Mechanical World—". . . his work should form a very acceptable reference book for those concerned with workshop production, while students of the subject will find it a suitable text-book."

ELEMENTARY METALLURGY FOR ENGINEERS

By G. F. C. GORDON, M.A., A.M.I.C.E., M.B.H.I., Lecturer in Engineering Materials in the University of Cambridge. **8s. 6d.** net.

Electrical Times—"For anyone desiring to obtain a good elementary grounding in the subject of metallurgy, this book is just what he needs."

PROBLEMS IN ELECTRICAL ENGINEERING *With Answers*

By S. PARKER SMITH, D.Sc., M.Inst.C.E., M.Inst.E.E. Crown 8vo. *Illustrated.* **6s.** net.

This book covers the ground for most College and University courses in Electrical Engineering, for the Graduateship examination of the Institution of Electrical Engineers, for all the City and Guilds examinations in Electrical Engineering Practice, and for the relevant courses for National Certificates and Diplomas in Electrical Engineering.

Electrical Review—"The book is one which may be recommended almost without qualification . . . . Every teacher of electrical engineering who has questions to set should immediately add it to his library."

CONTINUOUS CURRENT ENGINEERING *An Introductory Course*

By ALFRED HAY, D.Sc., M.I.E.E.
Third revised and enlarged edition. **14s.** net.

Engineering—"Teachers have always regarded this . . . as among the best text-books on electrical technology."

Complete Scientific and Technical Catalogue post free on application to

6787

CONSTABLE & CO., 10 & 12 ORANGE STREET, W.C.2.

PATENTS FINANCE TRUST, LIMITED

54, FINSBURY PAVEMENT, LONDON, E.C.2.

Supervise Patent agreements and collect Royalties.

Trustees in connection with Patent rights.

Negotiate sales abroad.

Represent Patentees in all relevant questions and legal matters.

Patent rights, thoroughly investigated, available.

Correspondents abroad.

Finance procured for approved first-class Patents.

NEW McGRAW-HILL BOOKS

Air Conditioning

By JAMES A. MOYER and RAYMOND U. FITTZ. 375 *pages*, 6×9, *illustrated.* 24/- *net.*

A complete engineering treatment of air conditioning. The first half covers theoretical fundamentals and discusses various phases of air conditioning such as air filtration, refrigeration, humidity control air washers, etc. The second half gives a thorough study of design requirements and typical designs for a wide variety of applications.

Symmetrical Components—

As Applied to the Analysis of Unbalanced Electrical Circuits

By C. F. WAGNER and R. D. EVANS. 437 *pages*, 6×9, 218 *illustrations.* 30/- *net.*

Presents the fundamentals of the method now generally accepted for calculating problems associated with unbalanced short-circuits on power systems. Detailed consideration is given to the determination of apparatus constants required for this method. In addition, the method is extended to the consideration of simultaneous faults, metering of unbalanced system conditions, phase-balancers, and the performance of induction motors under unbalanced conditions.

High-Frequency Measurements

By AUGUST HUND. 491 *pages*, 6×9, 373 *illustrations.* 30/- *net.*

This is a reference book for research workers, students and teachers, giving a thorough discussion of high frequency phenomena applied to measurements. The subject matter is treated critically, presenting up-to-date practice and theory. The applications are presented in a manner elementary enough to meet the needs of any one interested in carrying on high frequency measurements and research work.

The Physics of Electron Tubes

By L. R. KOLLER. 205 *pages*, 6×9. 18/- *net.*

Presents the fundamental physical phenomena involved in the operation of electron tubes in a thorough yet not ultra-technical treatment. Emphasis is placed on what takes place inside the tube rather than the circuits in which the tubes operate or the applications of the tubes.

Standard Handbook for Electrical Engineers

By FRANK F. FOWLE, Editor-in-Chief. Total issue, 105,000. *Sixth edition*, 2,790 *pages*, 4½×7, *fully illustrated, thumb-indexed, flexible.* 42/- *net.*

The sixth edition of this well-known handbook brings it right up to date and representative of latest advances, standards, data and practice in the electrical engineering field. It is 600 pages larger than the fifth edition and three-quarters new in point of subject matter. The contributors have been increased to 91 in number, permitting of much more specialised treatment. Whole new sections have been added—many entirely rewritten—every section revised—every step taken that could contribute toward continuing the Standard Handbook as the one complete, dependable reference manual of the electrical engineering profession.

McGRAW-HILL
Aldwych House, London, W.C.2